environment & PARKS

BC

1986 87 ANNUAL REPORT

88-03931/

BC
E523
B
1986-87
c.6

Province of British Columbia
Ministry of Environment and Parks
Annual Report, 1986/87

Honourable Bruce Strachan
Minister

T. R. Johnson
Deputy Minister

British Columbia Cataloguing in Publication Data

British Columbia. Ministry of Environment and Parks.
Annual report. -- 1986/87-

Continues: British Columbia. Ministry of Environment. Annual report. ISSN 0227-7506
Continues in part: British Columbia. Ministry of Lands, Parks and Housing. Annual report. ISSN 0838-1976
Report year ends Mar. 31.
ISSN 0838-1933 = Annual report - Ministry of Environment and Parks (Victoria)

1. British Columbia. Ministry of Environment and Parks - Periodicals. 2. Environmental policy - British Columbia - Periodicals. 3. Parks - Government policy - British Columbia - Periodicals.

HC117.B7B757 354.7110682'32

To His Honour
The Lieutenant Governor of the
Province of British Columbia

May It Please Your Honour:

Herewith I beg respectfully to submit the annual report of the British Columbia Ministry of Environment and Parks for the period April 1, 1986 to March 31, 1987.

Bruce Strachan
Minister of Environment
and Parks

The Honourable Bruce Strachan
Minister of Environment and Parks

Sir:

I have the honour to submit the annual report of the British Columbia Ministry of Environment and Parks for the period ended March 31, 1987.

T.R. Johnson
Deputy Minister

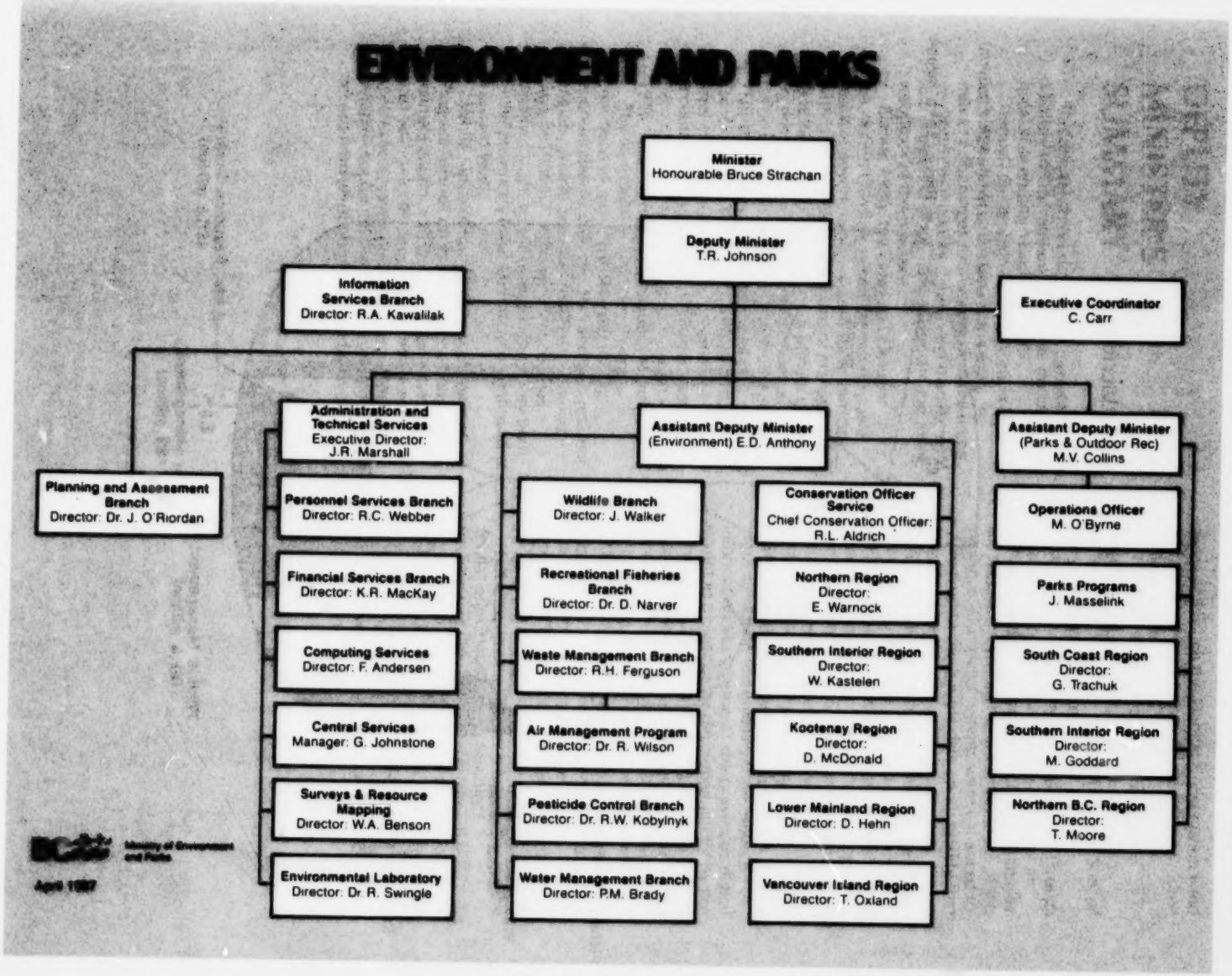
Contents

Deputy Minister's Summary 9

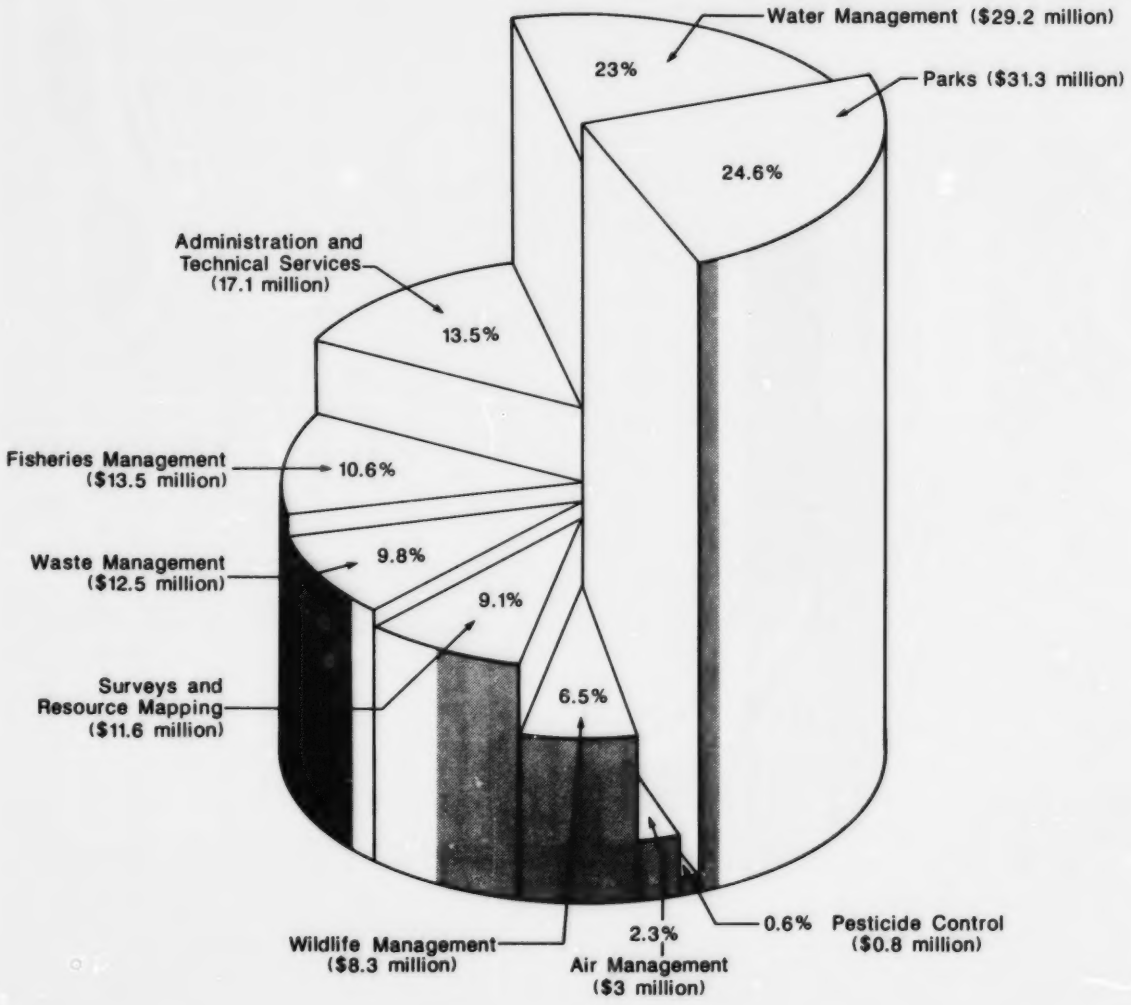
Programs

Parks and Outdoor Recreation 11
Recreational Fisheries Management 19
Wildlife Management 25
Water Management 37
Air Management 43
Waste Management 47
Pesticide Control 53
Surveys and Resource Mapping 57
Administration and Technical Services 59
- Financial Services 59
- Personnel Services 62
- Central Services 63
- Planning and Assessment 64
- Environmental Laboratory 67
- Computing Services 68
- Conservation Officer Service 69
- Information Services 71

Environmental Appeal Board 74


ENVIRONMENT AND PARKS
Minister
Honourable Bruce Strachan
Deputy Minister
T.R. Johnson
Information Services Branch
Director: R.A. Kawalilak
Executive Coordinator
C. Carr
Planning and Assessment Branch
Director: Dr. J. O'Riordan
Administration and Technical Services
Executive Director: J.R. Marshall
Personnel Services Branch
Director: R.C. Webber
Financial Services Branch
Director: K.R. MacKay
Computing Services
Director: F. Andersen
Central Services
Manager: G. Johnstone
Surveys & Resource Mapping
Director: W.A. Benson
Environmental Laboratory
Director: Dr. R. Swingle
Assistant Deputy Minister
(Environment) E.D. Anthony
Wildlife Branch
Director: J. Walker
Recreational Fisheries Branch
Director: Dr. D. Narver
Waste Management Branch
Director: R.H. Ferguson
Air Management Program
Director: Dr. R. Wilson
Pesticide Control Branch
Director: Dr. R.W. Kobylnyk
Water Management Branch
Director: P.M. Brady
Conservation Officer Service
Chief Conservation Officer: R.L. Aldrich
Northern Region
Director: E. Warnock
Southern Interior Region
Director: W. Kastelen
Kootenay Region
Director: D. McDonald
Lower Mainland Region
Director: D. Hehn
Vancouver Island Region
Director: T. Oxland
Assistant Deputy Minister
(Parks & Outdoor Rec)
M.V. Collins
Operations Officer
M. O'Byrne
Parks Programs
J. Masselink
South Coast Region
Director: G. Trachuk
Southern Interior Region
Director: M. Goddard
Northern B.C. Region
Director: T. Moore
Ministry of Environment and Parks
April 1987

MINISTRY BUDGET $127.3 MILLION



DEPUTY MINISTER'S SUMMARY

This annual report documents the work of the Ministry of Environment and Parks during the fiscal year ending March 31, 1987.

Through the programs and services whose activities are described in these pages, the ministry discharges its mandate of maintaining environmental quality through the management and protection of the land, water, air and living resources of the province.

During 1986, the Parks and Outdoor Recreation Division joined the ministry as a result of government reorganization, bringing with it the additional mandate of managing and developing a quality system of provincial parks, recreation areas and ecological reserves.

For B.C. Parks, it was an eventful year. The 75th anniversary of the provincial park system coincided with the highest park attendance level ever recorded. Implementation of the recommendations of the Wilderness Advisory Committee, which submitted its report in March 1986, resulted in major additions to the system.

The Recreational Fisheries Program continued to provide freshwater fishing opportunities to both resident and non-resident anglers, whose activities totalled five million days in 1986/87. Although licence sales declined slightly, stocking of high quality trout in the province's lakes and streams continued at a record level.

While much of the Wildlife Management Program focuses on game species, non-game animals continue to gain attention. During the past year, selected amphibian, reptile and bat species were given protection under the Wildlife Act for the first time. In addition, a record number of projects undertaken during the year through the Habitat Conservation Fund will enhance both game and non-game wildlife as well as fish.

The need to develop a comprehensive management system for special wastes was addressed through the appointment of a Special Waste Advisory Committee.

Air quality concerns were addressed through increased monitoring of major sources of air pollution and development of control strategies for specific air pollutants in various areas of the province. Computer systems were enhanced to collect up-to-the-minute data on air quality from on-site monitors.

Significant work completed under the Water Management Program included six provincial dyking program projects and dykes constructed under the Fraser River Flood Control Program. The Zosel Dam replacement, undertaken jointly with Washington State, was essentially completed by the end of the fiscal year.

The year also saw substantial progress in the implementation of TRIM (Terrain Resource Information Management), the province's digital mapping project being developed jointly by the Surveys and Resource Mapping Program and the private sector mapping industry. This project is expected to result in wide benefits to resource management and to the economy as a whole.

Discharging these responsibilities, and the many others which are documented in this report, depends increasingly on close cooperation with industry, other levels of government, and the concerned public.

Not least among the year's highlights was the annual presentation of the Minister's Environmental Awards, which recognize significant contributions to the environmental well-being of the province. For 1986, they were awarded to a citizen's group, a municipality, and two forest industry companies. In future years, the awards will be given in an expanded range of categories.

Parks and Outdoor Recreation Division

The Parks and Outdoor Recreation Division (BC Parks) is responsible for the designation, management and conservation of a land and water based system of parks, recreation areas and ecological reserves containing the best representative elements of British Columbia's natural and cultural heritage for the enjoyment, inspiration and recreational use of British Columbians and their visitors. It also develops and implements policies and programs to ensure equitable, safe and responsible use of public resources for outdoor recreation in the province.

The division is made up of three major program areas: Provincial Parks, Ecological Reserves, and Outdoor Recreation Services.

Legislation Administered

Park Act
Ecological Reserves Act
Park (Regional) Act
Motor Vehicle (All Terrain) Act
River Rafting Regulations and Boating Restriction Regulations pursuant to the Canada Shipping Act

Provincial Parks Program

This program preserves and protects outstanding examples of British Columbia's scenic natural environment, presents significant cultural or natural features and encourages people to enjoy the outdoors. It maintains park facilities with a present value of approximately $272 million, and manages both private and public uses of park lands and resources.

This program vigorously promotes support for the parks system to ensure that visitor stays are safe and enjoyable.

Fiscal Year Summary

Park Land Acquisition and Planning

During this fiscal year, major new additions were made to the park system, including a number of outstanding wilderness areas. In addition, the future management of a number of parks with a mixed history of both protection and commercial resource harvesting was resolved. The decisions made establish a firm direction toward full protection of the parks while recognizing and working to resolve existing legal tenures. These actions stem, in large part, from the work of a committee of private citizens established during the previous fiscal year, known as the Wilderness Advisory Committee (WAC).

At the beginning of the year the report of the Wilderness Advisory Committee was presented to Cabinet, which approved the committee's recommendations in principle. This committee reviewed nine existing parks and conservancies, eleven proposed parks and four proposed ecological reserves. By the end of the fiscal year these actions resulted in an increase to the parks system of 816,893 hectares. Negotiations began with the federal government toward creation of a national park on South Moresby, and funding was approved for acquisition of lands for three ecological reserves. The remaining four study areas will be dealt with in the next fiscal year.

An interministry protocol agreement was developed, allowing for the exploration of mineral resources in new provincial recreation areas.

The Wilderness Advisory Committee also made recommendations on the process and legislation for designation and protection of wilderness in British Columbia. Announcements and legislative amendments on this are expected to be introduced during the 1987/88 fiscal year.

In keeping with the expanded cultural and historic mandate of the Ministry of Tourism, Recreation and Culture, the responsibility for management of Barkerville and Fort Steele Historic Sites was transferred from BC Parks.

Other lands were also added to the park system during the year. On the Coquihalla Highway, three new parks were established to serve the travelling public on this new route. In the Kootenays, Elk Lake park was extended as part of the review of forest wilderness values on the western slope of the Rockies. On Kootenay Lake, land was purchased at Kaslo Bay to provide a boat launch, and on Trout Lake and at Naikoon Park purchase of property will further ensure protection of the existing parks.

The Assistant Deputy Minister approved master plans for Wells Gray Park, Schoen Lake Park, and Nancy Green Recreation Area.

Resource Management and Facility Maintenance

Grants towards facility development projects made to Class C Parks boards totalled $6,461. Approximately $2.7 million was expended on the upkeep and maintenance of the developed facilities in provincial parks.

Resource management activities included a study of grizzly bears in parks to determine their numbers, habitat, areas of concentration, and interaction with human activities. As a result of this study, grizzly bear-visitor management plans will be developed to reduce the possibility of conflicts. A western spruce budworm outbreak at Paul Lake Provincial Park was brought under control through a cooperative effort with the Ministry of Forests and Lands in the aerial application of a natural control agent.

Wildlife population counts, hunter reports evaluation, biophysical studies and creel surveys were conducted so as to determine the health and numbers of fish and wildlife in parks. An intensive study of the deer population on Sydney Island Marine Park was begun.

Visitor Services

BC Parks celebrated a banner year, experiencing the highest visitor attendance level ever recorded. A Parks Information booth located in the BC Pavilion at Expo 86 catered to some 80,000 individual requests. This was complimented by year-long celebrations commemorating the 75th anniversary of the founding of the Provincial Park System. The 75th birthday featured a series of events in parks and communities across the province heralded by the extremely successful introduction and adoption of "Jerry the Moose" as the mascot of the Parks System.

Attendance levels increased by just over 10 per cent, bringing the total recorded use to 17,457,981 visits. Camping use was approximately two million visits, with recorded camping attendance three per cent over that recorded in 1985. Campground revenues amunted to $3,531,143 reflecting the increase in camping visits for the year.

The annual Customer Satisfaction Survey asked nearly 6,000 park visitors to rate the facilities and services provided in provincial parks. Over eight per cent of those surveyed rated BC Parks as "excellent" or "above average". Areas of concern identified in the 1985 survey showed substantial improvement as a result of remedial action undertaken during the year.

The safety and security of park visitors remains a number one priority for the agency. Approximately 82,000 hours were spent on duty by park security staff, a 16 per cent increase over 1985. This enhanced vigilance contributed to the lower incident levels for some offences, while the substantial increase in park attendance resulted in higher levels in other areas.

Interpretive programs were provided in 41 parks and were enjoyed by more than 600,000 people. Private contractors provided programming in 19 of these parks.

Two new Visitor Centres were opened in 1986, in Clearwater for Wells Gray Provincial Park and at the Mount Robson viewpoint. New displays were installed in the Manning Visitor Centre and the Newcastle Island Pavilion.

Provincial park volunteers shared their time and knowledge to significantly improve the visitor experience in 1986. The campground host program was expanded to include more than 55 parks, up from 30 the year before. Park Host programs were sponsored in provincial park campgrounds, marine parks, backcountry parks and day-use areas. In addition, an estimated 700 volunteers contributed more than 18,000 hours to a variety of activities, ranging from quilt weaving demonstrations to nature walks.

The popularity of these programs has significantly increased over the past few years, as have the number of volunteers and the hours they contribute. This trend is expected to continue in 1987.

Provincial Parks publications continue to be a primary source of information for the public. Nearly two million copies of some 60 different titles were printed and distributed. Three outdoor safety and awareness booklets were updated, reformatted and reprinted.

Five new concessions were established during the year, resulting in a total of 30 operated under Park Use Permit having a gross revenue over $1.85 million. In addition, 50-year Ski Operator Permits for Cypress, Manning and Mount Seymour are in effect.

Private sector involvement in park services, either by contract or by volunteers, continued this year. More contracts were let for full park services including all park maintenance and

campground fee collection, nature interpretation and supplying firewood.

Ecological Reserves Program

Ecological reserves are set aside to preserve samples of representative, rare or endangered ecosystems of British Columbia. They offer long-term research and educational opportunities as well as casual, non-consumptive public uses, such as nature photography and bird watching.

During 1986/87 the Haley Lake (93 ha) and Katherine Tye (3 ha) reserves were created to protect respectively the endangered Vancouver Island marmot and the rare phantom orchid. The ecological reserve system now includes 117 reserves covering 154,630 hectares, of which roughly one-third consists of marine waters.

Thirty-six research projects were conducted in ecological reserves, including 11 projects at Robson Bight alone. Research was sponsored in relation to rattlesnake relocation in the Campbell-Brown reserve. Monitoring of researchers/photographers/recreationists continued throughout the year.

A new "Guidebook to Ecological Reserves in British Columbia" was in preparation; this will provide a map and text description for all reserves. The publication "List of Reports and Publications for Ecological Reserves in British Columbia" was produced and distributed to 200 researchers, libraries, and other organizations. Roughly 150 requests for information were handled.

Management issues were dealt with in 15 reserves, including the building of an enclosure fence in the Lasqueti Island reserve. Phase 2 of the Robson Bight Management Plan was completed. Eight replacement and two new volunteer wardens were appointed during the year.

Outdoor Recreation Services Program

This program represents provincial interest in the management and allocation of the province's outdoor recreation resources, and provides the administrative mechanisms for coordinating the development and implementation of provincial policies and programs to achieve equitable, efficient, safe and responsible utilization of public resources for outdoor recreation in British Columbia.

During 1986/87, support for non-profit organizations engaged in the promotion of outdoor recreation safety and public service was provided through financial and administrative assistance. In excess of $25,000 were given in grants to these groups.

River Rafting Regulations and Boating Restriction Regulations, pursuant to the Canada Shipping Act, are administered by this program on behalf of the federal government. Rafting Regulations ensure that river rafting companies and their staff meet certain equipment and operating standards to encourage safer commercial rafting services on selected B.C. rivers. Thirty-five rafting companies were issued permits and 162 boatmen were licensed under these regulations.

The Boating Restriction Regulations are implemented to avoid unsafe boating situations on the waterways of the province. A number of applications for boating restrictions were received and processed. There are currently 244 restricted waterways in the province and it is anticipated that number will increase in the next fiscal year.

Implementation of the Recreation Corridors program for trails and waterways proceeded with the first system plan of candidate areas, which had been previously presented to the public. Studies were undertaken by Parks staff on the Cowichan River, Inside Passage, Chilliwack River and Tatshenshini River.

RESOURCE/PARK USE PERMIT TABLE

Type	82/83	83/84	84/85	85/86	86/87
Private Purposes (cabins, access roads, etc.).....	158	124	117	195	203
Public Service (guiding, resorts, etc.).....	128	136	151	178	159
Industrial/Commercial Use (pipelines, transmission lines, etc.).....	265	303	334	362	338
Provincial or National Public Benefit (scientific reserach, movies, etc.).....	72	76	47	15	45
TOTALS.....	623	639	649	750	745

CONTRACT SUMMARY TABLE - 1986/87

Program		No. of Contracts	Value of Contracts
Visitor Services			
Park Maintenance		202	2,378,966
Interpretation		43	446,173
Firewood		62	396,177
Minor		226	147,613
	Sub-Total	533	3,368,929
Resource Services			
Capital Maintenance		258	1,925,507
Resource Management		40	179,477
	Sub-Total	298	2,104,984
Planning & Ecological Reserves		23	74,769
Finance & Administration		33	129,601
	TOTAL	887	5,678,283

GRANTS ISSUED

Grantee	Amount	Purpose
B.C. Snow Vehicle	$15,000.00	Support of federations safety training and education program.
Outdoor Recreation Council of B.C. ...	5,000.00	Assist in the printing of outdoor recreation safety brochures.
Canadian Red Cross Society	5,200.00	Support Red Cross Society Societys' Safety, Training and Education program.
TOTAL	$25,200.00	

PARK MANAGEMENT - YEARLY COMPARISON

	1982/83	1983/84	1984/85	1985/86	1986/87
Visitation:					
Campground Use	2,288,711	2,145,111	1,989,475	1,963,830	2,028,637
Day Use	13,042,078	12,841,189	12,488,974	13,556,225	15,126,906
Boating Use	241,191	257,773	268,656	301,103	302,438
TOTAL VISITATION	15,571,980	15,244,073	14,747,105	15,821,158	17,457,981
Revenue (000$):					
Campground	2,837	2,821	3,491	3,409	3,552
Park Use Permits and Concessions	217	185	133	170	214
TOTAL	3,054	3,006	3,624	3,579	3,766
Expenditures (000$):					
Capital	2,609	3,493	4,143	9,898	2,575
Land Acquisition	194	128	110	169	92
Operations	24,191	22,179	23,386	25,312	25,858
TOTAL	26,994	25,800	27,639	35,379	28,525
Adjusted Operation	28,062	24,508	24,906	26,122	25,858
Adusted Total	31,313	28,509	29,436	36,511	28,525
Staffing (Man Years):					
Yearly	388	353	288	295	301
Seasonal	378	269	269	253	244
TOTAL	766	622	557	548	545
Resource Management Indicators					
Park Hectares (thousand)	4,562.6	4,612.5	4,644.8	4,644.6	4,792.6
BC Population (thousand)	2,791.0	2,820.5	2,857.7	2,883.5	2,906.0
Park area per resident	1.63	1.64	1.63	1.61	1.65
Park investment/resident (adjusted)	11.22	10.11	10.30	12.66	9.81
Imp. landscapes represented	30/52	31/52	31/52	31/52	35/52
Imp. Management plans completed	19/70	22/70	24/70	33/70	36/70
Visitor Services Indicators					
Visitors per staff man year	20,329	22,093	26,478	28,871	32,033
Operation cost/visitor (adjusted)	1.80	1.61	1.69	1.65	1.48
Campsite occupancy	68	63	56	54	56
Campground revenue per campsite ($)	269	265	312	301	314

[1] Visitation is for calendar year ending in fiscal year.
[2] Expenditures adjusted for inflation to 86/87 fiscal Vancouver C.P.I.
[3] Hectares for calendar year ending in fiscal year.
[4] Statistics Canada based on '81 census.
[5] Camper party nights divided by campsites.

CHANGES TO THE PROVINCIAL PARKS SYSTEM 1986/87 FISCAL YEAR:

	Area (Hectares)
New Parks/Recreation Areas	
Coquihalla River Recreation Area	100
Coquihalla Canyon Recreation Area	130
Akamina Kishinena Recreation Area	10,915
Elk Lakes Recreation Area	11,620
Brooks Peninsula Recreation Area	28,780
Gitnadoix Recreation Area	58,000
Wokkpash Recreation Area	37,800
Cascade Recreation Area	16,680
Fiordland Recreation Area	91,000
Hakai Recreation Area	122,998
Kakwa Recreation Area	127,690
Kokanee Glacier Recreation Area	7,275
Stikine River Recreation Area	217,000
Wells Gray Recreation Area	13,963
Coldwater River Park	76
Tweedsmuir Recreation Area	97,588
Strathcona Recreation Area	10,250
TOTAL	851,865
Additions to Parks	
Strathcona Park	550
Princess Louisa Park	21
TOTAL	571
Parks Upgraded from Class B to Class A	
Strathcona Park	191,881
Tweedsmuir Park	896,658
TOTAL	1,088,539

Park System as of March 31, 1987

Type	Number	Area (Hectares)
Class A	292	4,104,815
Class B	2	23,729
Class C	35	1,146
Recreation Area	47	1,113,411
Wilderness Conservation Area	1	131,523
TOTAL	377	5,374,624

RESOURCES USED - YEARLY COMPARISON
(FTE and Operational Expenditures - Office Breakdown)

Office	1985/86 FTEs Person Years	1985/86 Operational Expenditures ($000)	1986/87 FTEs Person Years	1986/87 Operational Expenditures ($000)
Headquarters Victoria	64	3,430	59	3,879
South Coast Regional Office	16	1,035	18	1,133
Strathcona District	50	1,945	49	2,066
Malahat District	35	1,416	34	1,427
Fraser Valley District	88	3,527	90	3,796
Garibaldi/Sunshine Coast District	34	1,375	33	1,490
Southern Interior Regional Office	17	772	19	1,055
Thompson River District	37	1,912	38	2,349
Okanagan District	24	1,154	26	1,349
West Kootenay District	25	1,094	27	1,156
East Kootenay District	23	1,058	26	1,209
[1]Fort Steele Historic Park	21	1,033	13	TRANSFERRED
Northern Regional Office	14	889	14	1,011
Skeena District	19	993	19	1,132
Cariboo District	20	920	18	911
Prince George District	21	992	20	1,021
Peace-Liard District	17	803	16	875
[1]Barkerville Historic Park	23	964	21	TRANSFERRED
	548	25,312	545	25,859

[1]Transferred part way through year to Ministry of Tourism, Recreation and Culture.

Recreational Fisheries Program

The goal of the Recreational Fisheries Program is to provide social and economic benefits to the Province of British Columbia through conservation and management of freshwater fisheries and associated habitats. Consistent with that goal are three objectives:

1. To maintain and enhance habitats which support natural and cultured populations of fish.
2. To provide abundant and diversified recreational opportunities while protecting desirable populations of wild fish.
3. To support and regulate uses of fish for social and economic benefits.

Legislation Administered

Fisheries Act (Canada) and Regulations
Wildlife Act and Regulations
Fisheries Act (B.C.) and Regulations

Recreational Fisheries

Inland Fisheries Management

Inland fisheries management is directed toward conservation of freshwater fish populations and protecting and improving sportfishing to meet angler demands. In 1986/87, almost 277,000 resident and 76,000 nonresident freshwater angling licences and over 29,000 steelhead and 1,400 special waters licences were sold. This intense demand for angling in British Columbia emphasizes the need to manage native fish stocks by protecting, restoring and enhancing fish habitat, planting hatchery fish, and applying angling regulations to conserve fish stocks.

The annual stocking of lakes and streams with fry, fingerlings and catchable-size trout is a major function of the nine provincial hatcheries. In 1986/87, 820 lakes and streams were stocked with approximately 11 million rainbow, cutthroat, steelhead, brook and brown trout and kokanee. Some 80 tonnes of fish were liberated throughout the province, comprising of many different stocks of the six species.

Prevention of disease in hatcheries is of utmost importance. For this reason, 20 different stocks of rainbow and cutthroat trout, lake char, and kokanee were examined at spawning time for IHN virus and the bacterium causing kidney disease (BKD). Kokanee from Mission Creek in the Okanagan and rainbow trout from Puntzi Lake (Cariboo) were found to be positive for IHN. Some kidney disease bacteria were discovered in rainbow trout from Heffley Lake near Kamloops, and increasing numbers of fish from a variety of sources are being found to have a low incidence of kidney bacteria.

Evaluation of fish diets continues as companies strive to improve feed performance. Use of semi-moist diets may have contributed significantly to the well-being of fish reared in provincial hatcheries in 1986. Further evaluation should confirm this hypothesis. In another area of evaluation, supplementary oxygen is being tested as a means of increasing oxygen and reducing nitrogen in hatchery water supplies.

Land was purchased at Dragon Lake, in the Cariboo, to provide a spring egg collection station for rainbow trout. At Skaha Hatchery, near Penticton, title to property around the spring water supply was secured.

For the first time, Loon Creek Hatchery (Cariboo) staff cultured kokanee fry to be released in 1987 in three regions of the province. Since construction, Hanceville Hatchery, also in the Cariboo, was operated during the summer months. In 1986, approximately one-half million rainbow trout were produced for fall fingerling stocking as well as to evaluate trout growth rates at this site.

Dolly Varden egg collections for the Hill Creek Hatchery on Upper Arrow Lake were moderately successful. Adult fish were captured from Meadow Creek, Jordan River and the Columbia River. Some 50,000 eggs were collected, half of which were from Meadow Creek which is now being given consideration as the primary egg collection site for Dolly Varden.

About 34,000 people visited the various provincial hatcheries in 1986/87. In conjunction with Expo 86, rainbow and cutthroat trout were provided for the artificial stream at the B.C. Pavilion exhibit.

The Habitat Conservation Fund, supported by the $3 angling licence surcharge, continued to play an important and diversified role in fisheries management. A major focus was improvement of spawning streams associated with small lakes. On southern Vancouver Island, stream clearance and gravel additions were completed in outlet streams at Dougan, Flora, and Wild Deer lakes. Similar activities were continued at Loon Creek, tributary to Loon

Lake, in the Thompson-Nicola region. In the Cariboo, stream clearance restored fish access to spawning habitat in nearly 25 kilometres of stream associated with 10 lakes. Diversions in Mit and Blue Lead creeks provided access to stream spawning habitat at Milburn and Quesnel lakes, respectively.

In the Okanagan and Kootenay regions the emphasis in stream enhancement was on large-lake fisheries. Further expansion of spawning habitat in Peachland Creek and fishway construction in Powers Creek were completed to increase kokanee production to Okanagan Lake. For the same reason, a detailed planning study for the enhancement of Vernon Creek was also conducted. Extensive excavation and gravel replacement in the Okanagan River channel were undertaken to enhance kokanee spawning and production for Skaha Lake.

In the West Kootenays, a multi-year project was initiated to rejuvenate a portion of the Lardeau River spawning grounds used by the world-famous Gerrard rainbow trout from Kootenay Lake. Other ongoing projects associated with Kootenay Lake were aimed at increased production and survival of kokanee. The final phase of a four-year program to fully renovate the Meadow Creek spawning channel was completed, and capability to produce eight to 10 million kokanee fry per year was restored. A similar but smaller channel at Kokanee Creek was completed and had a good spawning run of 4,400 kokanee in the fall. Redfish Creek (another channel previously constructed under the HCF) had a spawning run of 2,000 kokanee, which was quite low. This indicates that the West Arm is not supporting fry at the same levels of production as in the 1970s. The Meadow Creek spawning run of 720,000 kokanee was much higher than anticipated. Hill Creek channel continued to perform very well with a return of 70,000 fish.

In order to maximize growth and survival of kokanee fry produced from Kokanee and Redfish Creek spawning channels, fertilization of the West Arm of Kootenay Lake was initiated as a pilot study. Results indicated localized increases in productivity as a result of fertilization, and potentially greater availability of food organisms for kokanee fry. Fertilization was also continued at Salsbury Lake in the Lower Mainland. In the second year of fertilization, the summer phytoplankton densities in this lake averaged eight times greater than those in control lakes, and initial results indicate increased growth rates of kokanee.

Other methods of enhancing lake production of sport fish include chemical lake rehabilitation, lake aeration, and water storage. Twelve lakes were chemically rehabilitated to remove undesirable fish species: six lakes in the Kane Valley chain of the Thompson-Nicola region, four in the Kootenays and one in each of the Okanagan and Skeena regions. In one of the Kootenay treatments, Kiakho Lake near Cranbrook was rehabilitated for the purposes of establishing and maintaining a pure Westslope cutthroat trout brood stock for stream stocking programs.

Lake aeration projects were initiated at Hahas, Johnson and a small unnamed lake in the Kootenays, as well as Beaver Lake near Fort Nelson in northern B.C. Unfortunately, Beaver Lake did not become operational as it was plagued by equipment problems and severe weather conditions. An experimental solar-powered aerator installed on the unnamed Kootenay Lake appears to be operating well.

Two water storage projects were completed. One at Shesta Lake in the Omineca region raised the level of the lake to improve water quality conditions for fish production and survival through the construction of an outlet weir. The renovation of the outlet dam at Brenda Lake, in the Okanagan, was completed to maintain existing water storage, upon which the lake fishery depends.

The year also saw some new directions for the Habitat Conservation Fund. In the Lower Mainland, a novel program involving storm-drain marking was initiated to heighten public awareness of storm-drain pollution of stream habitats. In Kamloops, filming was begun for a video production explaining catch and release fisheries and providing instruction on proper release techniques.

Although enhancement of non-salmonid species is not new to the HCF, a project at Duck Lake in the Kootenays was undertaken to enhance the fishery for largemouth bass by adding sub-surface artificial reefs in selected areas of the lake. Selection of reef placement sites was not based on fisheries considerations alone, as Duck Lake also supports rich and diverse populations of waterfowl. Not only was waterfowl habitat avoided in selecting bass enhancement sites but reef additions in the selected areas should have the effect of moving angling effort away from waterfowl habitat and reduce existing disturbances to waterfowl. This project reflects the growing scope and integration of the Habitat Conservation Fund in fisheries management.

Aerial surveys of lakes in the Lower Mainland, Thompson-Nicola, Cariboo and Okanagan regions were conducted throughout

the 1986 fishing season to determine angler use. The use of this technique to survey angler use will help in making informed management decisions.

A survey of Vancouver Island anglers was conducted by a mail questionnaire to determine the angling effort and catch on Vancouver Island lakes. Questionnaires were mailed at the end of the 1986/87 licence year and responses will be analyzed later in 1987.

Initial analysis of nontidal sturgeon angling effort on the lower Fraser River indicated a catch of 1,800 fish, of which 500 were kept. Average harvest weight was 40 pounds resulting in a total sport harvest of 20,000 pounds. These results are based on reports from 600 of 1,100 anglers who obtained free sturgeon permits.

The number of freshwater Commercial Fish Culture permits issued to fish farmers and research labs to culture rainbow trout, common carp, Pacific salmon and/or Atlantic salmon increased from 171 in 1985/86 to 213 this year. Forty-two Nontidal Net Fishing licences were issued in the 1986 calendar year for the commercial or domestic harvest of crayfish, coarse fish (carp, suckers, squawfish, chub) and game fish (lake trout, whitefish, burbot, pike, walleye). The Federal/Provincial Transplant Committee reviewed 532 applications to transplant live fish or aquatic invertebrates in the province, of which 111 received conditional approval, 413 were approved without conditions and eight were refused.

Anadromous Fisheries Management

Since 1977, the province's main role in the Federal/Provincial Salmonid Enhancement Program (SEP) has been to protect and enhance stocks of steelhead and anadromous cutthroat trout.

Steelhead stocks are harvested by a number of fisheries, including a high-seas gillnet fishery, several inshore commercial fisheries, native food fisheries, and the sport fishery. Commercial gill net and native food fisheries continue to pose major problems to effective management of steelhead trout in many rivers of the province, particularly the Skeena and Fraser systems. The problems are complex but much effort is expended annually to develop acceptable alternatives to unselective harvests of weak or small populations of salmonids. Monitoring run strength for these stocks is an important activity of fisheries management and is accomplished by snorkel and creel surveys, catch analysis and juvenile abundance surveys. These data guide the regulation of the sport fishery and serve as the basis for negotiations with the federal Department of Fisheries and Oceans and native groups.

Enhancement of selected stocks of steelhead and cutthroat trout reared in federal, provincial and public hatcheries continued. Loon Creek Hatchery ceased to rear steelhead trout and chinook salmon in 1986 to allow more room for the culture of inland trout stocks, so Thompson-Nicola region steelhead were raised on contract at Spius Creek Hatchery. Steelhead releases this year consisted of 1.8 million fry and 1.1 million smolts to waters in the province. In addition, 199,000 sea-run cutthroat trout smolts and 16,000 fry were released in streams. The success of the steelhead stocking program is reflected in substantial hatchery adult returns to many rivers in the last few years. Hatchery steelhead comprised almost 27 per cent of the total provincial steelhead sport catch during the 1985/86 fishing season. The steelhead sport catch has increased significantly in recent years, with 145,344 fish being caught in the 1985-86 season compared to 50,924 in 1980/81.

The sea-run cutthroat program continues to present problems in the regulation of the fishery and the poor survival of hatchery releases. Sea-run cutthroat stocks seem much more fragile than steelhead. Their small-stream habitats are easily and frequently damaged by land use activities and they are easily overfished. Juvenile cutthroat are often competing with other fish species, particularly young coho salmon. Enhancement efforts have had limited success and stocks remain at risk.

Habitat protection, harvest regulations, fish culture and habitat improvement are essential to the management of steelhead and sea-run cutthroat trout. Severe reductions in daily and annual catch limits, combined with favorable environmental conditions, have resulted in many river systems reaching or exceeding historical levels of abundance of steelhead in recent years.

Wild steelhead management centres on ensuring that enough adult fish escape the commercial, native and sport fisheries and survive to spawn so that their progeny will provide good angling in the future. To determine the number of offspring resulting from spawning, fisheries biologists monitor juvenile stock abundance. Steelhead juveniles remain in their home stream from two to four years before going to the ocean. This allows sampling and estimation of the number of juvenile steelhead in various streams and prediction of how many will survive to adults. Regulations are instituted and, where stocks are particularly low, hatchery fish are planted.

Streams where juvenile steelhead stocks are monitored are called index streams. Nearby streams are generally assumed to have similar densities of young steelhead and are managed in a comparable fashion. Monitoring juvenile stocks in streams also indicates if management strategies are working. In 1986, juvenile stock monitoring was conducted on the Keogh, Chilliwack, Silverhope, Coquihalla, Chehalis, Seymour, Birkenhead, Squamish, Cranberry, Kispiox and Bulkley-Morice rivers.

Adult fish passing through a counting fence on the Keogh River, on Vancouver Island, showed the 1985/86 spawning run to be exceptionally large at 4,000 fish. Hatchery fish made up almost 75 per cent of the run which was not typical of other North Island streams.

The Chilliwack/Vedder River, in the Lower Mainland, was the single most important stream in the province for steelhead catch and angling effort during the 1985/86 fishing season. Silverhope Creek had its largest ever recorded run of summer steelhead with an estimated 450 fish spawning in 1986.

Recently reduced industrial activity in the Coquihalla drainage has allowed better growth and survival of juvenile steelhead. Construction of the new Coquihalla highway meant an anticipated decline in the wild steelhead population, the result of sandy materials being washed into and deposited in the river covering spawning habitat. To compensate for the destruction of fish habitat, large numbers of hatchery fry and parr were released in the Coquihalla. The 1986 adult run size was a record high (600 fish of which 450 were wild). Stocking of hatchery fry and parr between 1982 and 1986 should generate maximum adult returns in 1987 and beyond.

Preliminary investigations on the Chehalis, Seymour, Birkenhead and Squamish rivers showed that these streams are not producing at their full potential. There continues to be a problem with many hatchery smolts released into the Chehalis River remaining in the system rather than migrating to sea. Extremely low fry densities in the Birkenhead River will be partially remedied by the addition of hatchery fry in the near future.

The 1987 the Kispiox River steelhead run is expected to be better than average. The quality of the sport fishery, however, will depend to a large extent on the number of steelhead intercepted in the 1987 commercial net fishery at the mouth of the Skeena River.

Habitat protection and restoration remains an important priority for wild stocks, since about 75 per cent of fish production is from natural habitat. A barrier to fish migration on the Salmon River, on Vancouver Island, is the B.C. Hydro diversion which redirects Salmon River water to the Campbell lakes for power generation. This barrier eliminates access to several kilometres of upstream fish habitat; thus any Salmon River fish migrating downstream are lost to the Campbell lakes system. A diversion screen allowing the downstream passage of steelhead smolts across the Hydro diversion was constructed and operational by April 1, 1987. Steelhead fry stocked above the barrier over the last few years will make use of the diversion screen as they migrate to sea as smolts, thus contributing to the Salmon River steelhead sport fishery in two to three years. A fishway is also planned to allow upstream passage of trout and salmon past the diversion.

Research continued in the areas of stream fertilization, monitoring of steelhead ocean survival, stock assessment and computer modeling techniques.

British Columbia is now one of the few places in North America where large or unique fish can be caught in an uncrowded, wilderness environment. However, as more people seek these experiences even the fisheries of many remote rivers are threatened. To protect these valued resources, a Special Fisheries Policy has been developed. This new policy will be tested on a section of the Dean River, famous for its steelhead angling, in 1987. Fishery managers will regulate the total number of anglers on waters designated as Special Fisheries and anglers will be required to purchase a special permit to fish these waters.

The desire for quality angling experiences in wild surroundings has caused a substantial increase in angling guiding activities. Angling guide and assistants licence sales have increased from 163 in 1983 to 413 in 1986. Guiding is becoming a significant economic activity, particularly in northwestern British Columbia.

Habitat Management

Habitat Protection

The protection of fish habitat is the first objective of the Recreational Fisheries Program and 1986 proved to be a busy year. As industrial activity increased, especially in the northern part of the province, the capabilities of the program were stretched to the limit as staff attempted to keep up with greatly increased numbers of referrals. Approximately 16,000 referrals were processed this year. The forest industry continued to have the most pervasive

effects on fish habitat. The accelerating activities under the Forest Resource Development Agreement (FRDA) required the program to submit a series of issue papers to government in order to address the accelerated backlog of reforestation and silviculture activities under this federal/provincial agreement. Funding was also secured for research projects related to the management of FRDA impacts.

Subsidiary agreements, by which the Ministry of Forests and Lands (MOFL) would devolve most of their management activity and on-site presence to forest licencees, were a major item of negotiation. While the process is not yet widespread, it is still planned by the Ministry of Forests and Lands. This departure from the traditional regulation of licencees will have major ramifications for protection staff, as field surveillance by forestry personnel will be minimal, necessitating more field work by fisheries protection staff.

The volume of mining prospectuses and staged reports for mine development increased significantly as a result of improving gold prices. This level of activity is expected to remain unchanged through the next few years.

Habitat assessment and capability research continued on the Nechako River and encouraging responses from the rainbow trout stocks were noted. Considerable effort was required in assembling evidence related to the Department of Fisheries and Oceans v. Alcan court case regarding fisheries flows in the Nechako River.

A major accomplishment this year was the successful development of the Coastal Fish/Forestry Guidelines with DFO, MOFL and the Council of Forest Industries. This program will guide forest activities on the coast to efficiently conduct forest operations while protecting fish habitat. The guidelines will be implemented in 1987, beginning with an extensive training/education program for field operations staff of both government agencies and industry.

Research efforts were continued on studies of slope stability problems and fish habitat on the Queen Charlotte Islands. Studies at Carnation Creek culminated in a "15 year Workshop" at Nanaimo in October. This workshop brought together industry, researchers and agency staff to discuss the Carnation Creek results. The study is now the longest continuous North American study of the effects of forest harvesting on a stream ecosystem. Scientists from as far as Newfoundland and California attended the workshop.

Further implementation of the federal/provincial General Fisheries Agreement was also carried out. Under this agreement, a joint Habitat Management Committee has begun working toward cooperative efforts to better manage and protect fish habitat and to look at restoration of degraded fish habitats.

Habitat Inventory

The Habitat Inventory Unit provides four main services to the Recreational Fisheries Program: field operations; information system development; methods and procedures development; and support for specialized impact assessments.

During 1986/87, field inventory operations were carried out on 35 lake systems and two major river systems, resulting in lake survey reports, bathymetric maps and aquatic biophysical maps and data. Several new survey procedures were developed, including field survey cards, the use of video for aerial reconnaissance and a streamlined lake survey reporting process.

These new procedures are now cooperatively developed with the Federal Department of Fisheries and Oceans under the joint agreement on fisheries habitat and information systems. Other developments under this agreement include the Stream Information Summary System, to be accessible province-wide, and coordinated fish distribution mapping. Computerized mapping systems are being developed to support these map production objectives.

These information systems are being installed in each of the ministry's regional offices, and will provide a better information base for the habitat and fisheries management problems dealt with on a day-to-day basis. They will be particularly useful as support for the developing Ministry Referral System, and for the application of the stream classification process required for new Coastal Fisheries/Forest Guidelines which will be implemented soon.

Special purpose inventories for research and habitat impact assessments were also completed. This year detailed stream surveys were carried out at the Carnation Creek experimental watershed, on streams suffering from flow limitations in the Lower Mainland and on Vancouver Island, and for the development of channel stability and rate of cut assessment procedures with the Physical Processes Unit and the Ministry of Forests and Lands.

RESIDENT ANGLING LICENCE SALES 1984/85 TO 1986/87
(not including Habitat Conservation Fund impost fees)

	1984/85		1985/86		1986/87	
	Number	Value	Number	Value	Number	Value
B.C. Resident (Annual)	260,444	2,604,440	244,247	2,442,470	246,941	2,469,410
B.C. Resident (Short-term)	3.428	13,712	6,101	24,404	9,683	38,732
Senior Citizen	31,766	31,766	32,591	32,591	34,104	34,104
Steelhead	22,466	134,796	24,377	146,262	28,336	170,016
Total	318,104	2,784,714	307,316	2,645,727	319,064	2,712,262

NONRESIDENT ANGLING LICENCE SALES 1984/85 TO 1986/87
(not including Habitat Conservation Fund impost fees)

	1984/85		1985/86		1986-87	
	Number	Value	Number	Value	Number	Value
Canadian Resident (Annual)	24,998	299,976	21,649	259,788	21,389	256,668
Canadian Resident (Short-term)	14,466	72,330	17,181	85,905	22,259	111,295
Nonresident (Annual)	11,992	239,840	12,853	257,060	13,647	272,940
Nonresident (Short-term)	27,120	244,080	25,517	229,653	26,748	240,732
Canadian/Nonresident Steelhead	2,663	39,945	3,308	49,620	4,132	61,980
Special Lakes	707	10,605	N.A.	N.A.	N.A.	N.A.
Special Rivers	1,409	35,225	N.A.	N.A.	N.A.	N.A.
Special Waters	N.A.	N.A.	1,680	42,000	1,914	47,850
Total	83,355	942,001	82,188	924,026	90,089	991,465

Wildlife Management Program

The goal of the Wildlife Management Program is to maintain the diversity and self-sustaining ability of species representative of the major biophysical zones of the province, and to ensure that within the constraints of land capability and the biological limits of each species, wildlife is available in sufficient abundance to meet the aesthetic, cultural, recreational, ecological and economic needs of society.

Consistent with that goal, the objectives of the Wildlife Management Program are:

1. to maintain the natural diversity of wildlife species;
2. to maintain the natural diversity of wildlife habitat by minimizing the deleterious effects of man's activity, and to secure and enhance habitats, consistent with the ministry's objectives for wildlife production and the public's demand for wildlife;
3. to provide for public education and information relating to the wildlife program, the value of wildlife, and opportunities for wildlife use and public involvement in wildlife management;
4. to manage wildlife populations to provide for consumptive and non-consumptive use of wildlife consistent with program plans;
5. to minimize danger to life and damage to property caused by wildlife; and
6. to promote the maintenance of existing commercial uses of wildlife such as trapping and guiding, and to attempt to develop compatible new uses.

Legislation Administered

Wildlife Act and Regulations
Migratory Birds Convention Act and Regulations (Canada)
Game Export Act (Canada)

Birds, Endangered Species and Non-Game Wildlife

Four burrowing owls released as youngsters in the Okanagan in 1985 returned to breed successfully in 1986.

Nine young bald eagles were taken from nests and shipped to California for reintroduction to the wild to augment an endangered population.

Additional surveys were done on the spotted owl. Status reports on it and on the flammulated owl were prepared for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

An inventory of nesting Peale's peregrine falcons was completed on the Gulf Islands, Northern Vancouver Island and the Queen Charlotte Islands. Nesting bald eagles were surveyed in the Lower Mainland.

Papers on spotted owls and trumpeter swans were prepared and presented at conferences outside B.C. The ministry continued to have representation on COSEWIC. The Convention on International Trade in Endangered Species of Wild Fauna and Flora was administered and 869 export permits issued.

Field work with the aid of the World Wildlife Fund and The Nature Trust of British Columbia was carried out in the Southern Okanagan for two species of bats, the spotted bat and the pallid bat, by a survey crew under the direction of Dr. Brock Fenton of York University. Draft reports to COSEWIC on the keen's myotis, fringed myotis, spotted bat and pallid bat, all species found in Canada only in B.C., have been prepared by Jonathan Balcombe of York University.

Four species of bat were protected under the Wildlife Act (1982) regulations, as well as three amphibians and seven reptiles, including the short haired lizard and six species of snake. Cooperative preliminary studies of the effects of lake rehabilitations on reptiles and amphibians were undertaken with the Recreational Fisheries Branch.

A status report on the white-tailed jackrabbit and Nuttall's cottontail, by Dr. Sullivan of the Applied Manual Research Institute, is in final draft stages.

Ungulate Management

The Wildlife Branch is participating in a three-year cooperative management program with the United States on the international Caribou herd that utilizes the Selkirk Mountains in southern B.C., northern Washington and Idaho. Two transplants were conducted from British Columbia to Idaho, including 12 caribou from north of Revelstoke, and 14 caribou from the Ilgachuz Mountains near Tweedsmuir Park.

Transplants of elk, caribou, mountain goat and bighorn sheep were also made in several areas of the province to re-establish or

supplement populations. These included 11 caribou transplanted from the Ilgachus Mountains to Kappan Mountain, southwest of Williams Lake; seven Roosevelt elk transplanted from Vancouver Island to the Sechelt Peninsula; 38 Rocky Mountain bighorn sheep from Columbia Lake and Stoddard Creek to Fort Steele; eight California bighorn sheep from the Junction Wildlife Management Area to Word Creek, south of Williams Lake; 13 California bighorn sheep from Vaseux to Grand Forks; and 8 mountain goats from Penticton Creek to Tulameen Mountain in the Okanagan.

Several enhancements were made to the Ungulate Inventory Data Base, including a series of statistical programs for analyzing inventory data. To date, over 1000 inventories have been entered into the database.

Ungulate harvest estimates for the 1985/86 hunting season were 27,488 deer (62 per cent of total big game harvest), 11,504 moose (26 per cent), 3674 elk (8 per cent), 908 mountain goat (2 per cent), 456 mountain sheep (1 per cent), and 367 caribou (1 per cent).

The northeast wolf management project was reinitiated in 1987 when the impact of wolves increased following the halt of wolf control in 1986. After no wolf control in 1986, fall moose calf:cow ratios declined from 46:100 to 29:100, and elk calf:cow ratios declined from 71:100 to 28:100. Midwinter lamb:ewe ratios for Stone Sheep declined from 31:100 to 15:100, and caribou calf:cow ratios declined from 52:100 in the fall of 1985 to 30:100 in late winter 1987.

On Vancouver Island, 70 wolves were removed through trapping and shooting. Deer populations remain low and stable on northern Vancouver Island, and continue to decline on southern Vancouver Island.

Carnivore and Problem Wildlife Management

Wolf Management

Wolf population reduction was undertaken on Vancouver Island and in the Muskwa area of northeastern B.C. Wolf control will continue on a seasonal basis in these areas until ungulate inventory information indicates that production objectives have been realized.

Problem Wildlife

There were significant black bear problems throughout the province, particularly in the Lower Mainland. Ministry staff in this region responded to nearly 2,600 complaints related to black bears, about four times the average annual number. To help reduce this problem, the ministry has released a number of information brochures relating to bears, advising people how to avoid attracting bears into conflict situations. Fortunately there were no fatal incidents with either black or grizzly bears during the year.

While concern for agricultural damage by wildlife remained high, actual damage levels were low to moderate.

Guided Hunter Activity

During the 1986/87 hunting season 4,111 big game hunters were guided by British Columbia's guide outfitters. Of this total, 42 were resident hunters, 96 were non-resident Canadian hunters, and 3,978 were non-resident alien hunters.

The 266 active guide outfitters employed 883 assistant guides, plus a good number of wranglers, cooks and expediters.

Most hunters came from the United States (3,395 or 83 per cent). Twenty other countries and nine Canadian provinces were represented in the total number of hunters. The 4,111 hunters took 3,840 big game animals, a three per cent increase over the number killed in 1985/86.

Total direct revenue from non-resident licences, guide licences and royalties was $1,492,784.

Trapping

Approximately 300 students completed Trapper Education Program courses during the year.

The ministry continued its financial commitment to the development of humane trapping systems in British Columbia in 1986. Twenty-four thousand dollars was distributed in the final year of the Trappers Assistance Program, to help trappers obtain more humane traps. As well, the ministry financially supported the Trapper Education Program and contributed to support of the Fur Institute of Canada.

The Wildlife Branch embarked on a survey to determine the total contribution of trapping to the economy of British Columbia. Results of this survey will be available next year.

Commercial Game Farming

The feasibility of commercial game farming in British Columbia was actively reviewed because

of renewed interest in farming various ungulates for their meat and by-products.

Biometrics

Summary Statistics Data Base

The Summary Statistics Data Base, an integration of several major provincial data systems which acquire and process hunter effort and animal mortality information, was implemented in 1984/85. The Wildlife Branch has continued to enhance this data base during the 1986/87 fiscal year. The ministry's computer communication network allows regional staff immediate access to the data base, providing historical information back to 1976 for trend analysis, and current data for ongoing management activities. The Summary Statistics Data Base is updated frequently during the year to ensure the latest animal and hunter data are available for wildlife managers.

Tooth Return Program

The "Tooth for the Truth" program (ungulate tooth returns by successful hunters) continued for the 1986/87 fiscal year and received a total of 6,500 deer, moose and elk teeth from cooperating sportsmen. Respondents received, by return post, the age of their animal, plus a unique jacket crest as a token of appreciation for their assistance.

Limited Entry Hunting Draw System

The 1986 Limited Entry Hunting Draw computer system for fall hunts handled 75,579 applications, assigning 22,271 authorizations for eight species of animals in 50 areas involving 600 hunts. The smaller Limited Entry Draw for spring 1987 grizzly bear hunts in the Kootenays handled 1,238 applications for 317 authorizations. The Limited Entry system also incorporates a mail questionnaire to all deer, moose and elk hunters following each hunting season.

B.C. Resident Hunter Number System

The B.C. Resident Hunter Number system, incorporated in 1982, now has some 250,000 individual sportsmen recorded as eligible to hunt in British Columbia. It maintains a record of names, addresses and licences purchased each year, and provides the linkage between several major wildlife harvest data systems.

Annual Hunter Sample

The annual Hunter Sample questionnaire was mailed to some 80,000 sportsmen to determine their hunting activity and success during the 1986/87 hunting season. Response rates averaged 75 per cent. Estimates of harvest by B.C. resident hunters were produced for major big game, waterfowl and upland game bird species.

Compulsory Inspection

The Compulsory Inspection system recorded some 2,400 individual reports of harvest of cougar, grizzly bear, mountain sheep, caribou, and mountain goat throughout the province, and elk and wolf in some areas, by both resident and non-resident hunters. Under this system, all hunters must report the harvest of these species to ensure complete data is available to support the intense management activities required in some areas.

Research And Development

The wildlife research program was conducted and funded cooperatively with a variety of agencies, in both the government and private sectors. Among the participants were the ministeries of Forests, and Lands, Parks and Housing; the Spatsizi Association for Biological Research; several forest companies, the U.S. Fish and Wildlife Service; and, the Universities of British Columbia, Simon Fraser, Saskatchewan, and Victoria.

Integrated Wildlife/Intensive Forestry Research Program

The IWIFR Program completed its sixth year investigating the impact of intensive forestry on habitat needs of blacktailed deer and Roosevelt elk on Vancouver Island. Activity focused on carry-over activities such as data analysis and writing up, with decreased emphasis on field work. A total of six reports were printed this year. A second five-year phase was initiated, and a five-year blueprint was approved to direct future work.

While Phase 1 was directed primarily towards field research and production of a management handbook for finding ways to manage second growth forests for ungulate winter habitat, the primary direction of Phase 2 is towards development of integrated planning tools,

communication and training, and operational trials using Phase 1 findings.

Coastal Grizzly Project

The fifth year of the coastal grizzly project ended successfully, with a busy field season in the summer and intensive data analysis in the winter. A major progress report and working plan was produced that summarizes information gathered to date, outlines proposed management products, and presents the working plan for 1986. The intensive field work in the Kimsquit River Valley was replaced by (1) specific follow-up investigations to enhance some data sets and refine knowledge, (2) verification work on a pilot habitat suitability model, (3) collection of post-logging food production in some coastal watersheds, and (4) testing of field procedures for extensive coastal watershed evaluations to provide input into ongoing timber production plans.

Increased time was spent on developing products for transferring research results into useful tools for wildlife, habitat, and forest managers.

Wildlife Habitat Handbook Project

This project aims at producing computer and written tools to help forest and wildlife managers assess the impacts of proposed forest development on all classes of vertebrates. Progress made during 1986/87 included:

1. Completion of species notes to the camera-ready stage.
2. Drafting a manuscript that describes habitat classes for the province.
3. Completion of habitat suitability models for 144 species.
4. Beginning a demonstration area in cooperation with a Kamloops-based forest company, using computerized forest cover data bases to accumulate habitat input.

Inventory Methods for Caribou

The aim of the first phase of this long-term project was to recommend reliable census methods for northern B.C. caribou herds, based on detailed radio telemetry studies of caribou in Spatsizi Provincial Park. Two comprehensive reports were written, one on the biology of Spatsizi caribou, and the second on inventory procedures. Ongoing caribou inventory was carried out during this fifth year, with the intention of expanding the scope of the work to at least include wolves. Lack of funding from non-government agencies still remained as the major problem in accomplishing this objective.

Pathology of East Kootenay Bighorn Sheep

Work was completed on the extensive analyses of tissues and histological differences between sick and healthy bighorns. Advice was provided to regional management staff regarding measures that could be used to help prevent possible die-offs. The thesis report was written, and is awaiting final approval.

Flathead Grizzly Project

The objectives of this project, which is entering its eighth year, are to examine the habitat and population ecology of grizzly bears in the Flathead River drainage, in order to improve management of the species. Specific concerns relate to the impact of resource development on grizzlies and their habitat requirements, and on the impact of hunter harvest. Field work continued, but increased emphasis was placed on data-analysis and writing up, particularly regarding estimates of population size and home range areas, and on the the impact of human activity on habitat use.

Ecology of Southern and Central Interior Caribou

Four closely related research projects addressed this topic in 1986/87. In the Tweedsmuir Park area, radio-collared caribou are being monitored to identify migration routes and winter ranges, as inputs to planned timber harvest in winter habitat outside the park. In the Itchas-Ilgachuz-Rainbow Mountain area, radio-collared caribou are being surveyed to identify seasonal ranges and to monitor population dynamics. This herd appears to be increasing faster than other B.C. herds. Located in the Quesnel Highlands, the third project is using radio-telemetry to assess the impact of wolf predation on caribou, and to identify seasonal habitats of caribou. The fourth study is in Wells Gray Provincial Park, and is funded primarily by the Park Programs Branch. This study monitors about 25 caribou (radio-collared) to help determine annual movements of Park caribou, especially with respect to movements in and out of the Park and the interaction between caribou and recreational activities.

Nimpkish Valley Wolf/Deer Project

This project began in 1982/83, with the objective of determining the impact of experimental wolf control on deer populations in the Nimpkish Valley, Vancouver Island.

Results to date indicate significantly increased survival of deer in the wolf removal area compared to the non-removal area. Active fieldwork was completed in August, and a report that will present all data, conclusions, and recommendations is presently being written.

Research Needs for Habitat Enhancement

A new project this year, its objective is to define research and development projects required to meet the needs of wildlife and habitat managers. A problem analysis is being conducted to document enhancement activities to date in the province, describe problems and opportunities as seen by managers, assess the relevance of the existing literature, and identify how best to spend research time and money to meet management needs. A questionnaire was sent to all biologists presently conducting enhancement work, followed up by interviews and extensive extraction of relevant data from various reports, interim progress descriptions, etc.

Carnivore Species Management Review

In conjunction with the preparation of long-term species management statements, a program was initiated over the 1986/87 winter to initially review current management strategies for all large predators. This review process is designed to provide a program update on the basis of current knowledge and against a background of ecological, social and economic realities of the forthcoming decade. The underlying principle for the review is to secure the long term survival of all native predatory mammals within the province, in relative balance with other species and for the benefit of the hunting and non-hunting public. Special attention will be paid to grizzly bears and lynx due to their vulnerability to overharvest. Regulation changes and research programs will be recommended as necessary to protect all species.

Cougar Ecology

A study to assess the ecology of cougar living in the vicinity of the Junction area California bighorn sheep herd was initiated. Cougar have been radio-collared, and already data collection on home range, prey selection, habitat utilization, and population structure is underway. The study on cougar movement and predation is necessary in order to understand their importance as a mortality factor on the bighorn sheep, particularly on rams. The bighorn sheep are of provincial concern because of the use of the herd as a major source of transplant animals to other parts of the province and to the United States.

Furbearer Research

The Wildlife Branch initiated a furbearer research program in 1986/87. Two separate projects were undertaken: the use of second growth forests by pine marten, and the effects of herbicide application on small mammals. Both projects were conducted on Vancouver Island. The marten research will continue for an additional two years. The herbicide/small mammal research will be expanded to other locations throughout the province where herbicide application is projected to increase.

Health of Wildlife

A long-term project on wildlife health was initiated, with the first phase being the identification of diseases and parasites of importance to wildlife populations, those of public health significance, and those of possible significance to game-farmed species. A survey of Fraser Valley and Okanagan carnivores was carried out for evidence of exposure to sylvatic plague, and showed a very low incidence of past exposure in areas near the Washington border.

Technical Reports: 1986/87 Publications

R-12 Studies of radio-collared caribou in the Spatsizi Wilderness Park area, British Columbia, 1980-1984. D.F. Hatler, July 1986. 217 pp. (Also printed as Spatsizi Association for Biological Research Report No. 3)

B-45 A rationale for wolf control in the management of the Vancouver Island predator-ungulate system. D. Janz and I. Hatter. March 1986. 35 pp.

B-46 Thermoregulation and thermal cover of deer and elk on Vancouver Island: problem analysis. F.L. Bunnell, K.L. Parker, L.L. Kremsater, and S.W. Hovey. 1986. (Also printed as IWIFR-28).

B-47 Thermoregulation in black-tailed deer with particular emphasis on the effects of rain: working plan. K.L. Parker. 1986. (Also printed as IWIFR-29).

B-48 Raising black-tailed deer at natural growth rates. K.L. Parker and B. Wong. 1986. (IWIFR-30; printed in Canadian Journal of Zoology).

B-49 Estrus in black-tailed deer. K.L. Parker and M.P. Gillingham. 1986. (also printed as IWIFR-31).

B-50 Functional relationships between salal understory and forest overstory. D.J. Vales. 1986. (Also printed as IWIFR-32).

B-51 Vancouver Island Roosevelt elk/ intensive forestry interaction — Phase 1 (1981-1986). Job Completion Report K. Brunt, D. Becker and J. Youds. 1987. (Also printed as IWIFR-33).

WR-19 Effect of wolf control on black-tailed deer in the Nimpkish Valley on Vancouver Island. Progress report — 1984 August 31 to 1985 August 31. K. Atkinson and D.W. Janz. March 1986. 27 pp.

WR-20 Kechika Enhancement Project of northeastern B.C.: wolf/ungulate management. 1985/86 annual report. J.P. Elliott. December 1986. 17 pp.

WR-21 Muskwa Wolf Management Project of northeastern B.C. 1985-86 annual report. J.P. Elliott. December 1986. 15 pp.

Habitat Management

The Habitat Management Section serves five major functions: 1) habitat protection, 2) land management, 3) planning, 4) wildlife viewing, and 5) fund administration.

Habitat Protection

Regional staff processed approximately 18,000 referrals, and conducted field inspections of development proposals with the potential to impact wildlife habitat. Recommendations were made to other government agencies and negotiations with developers were undertaken to reduce the impact of developments on wildlife and its habitat.

Forestry

Forestry issues affecting wildlife habitat that were addressed included the Forest Resources Development Agreement, forest pesticide use, Timber Supply Area planning, the Emergency Bark Beetle Program, silvicultural referrals, and coordinated access management. A report on forest herbicide impacts on wildlife forage species was prepared. A Memorandum of Understanding concerning coordination of silvicultural activities and fish and wildlife management was signed.

Development of provincial guidelines for the protection of wildlife trees was initiated. Guidelines for the protection of wildlife were also developed for aquaculture operations. Helicopter disturbance to wildlife was reviewed due to increased heli-skiing activity.

Mining

Environmental impact reports for a number of metal and coal mine proposals were reviewed under the Mine Development Review Process. Recommendations were provided to reduce impacts of mine developments on wildlife.

Hydro Developments

The request for mitigation of wildlife impacts, should the Site C hydroelectric project proceed, was updated with the assistance of the Planning and Assessment Branch.

Highways

Wildlife/vehicle collisions were monitored. Reports indicate that more than 3,000 animals per year are killed on highways, representing vehicle damage costs of nearly $5 million. With respect to highway construction, the Habitat Management Section was involved in developing strategies to reduce the impact of the Coquihalla Highway on wildlife and its habitat.

Land Management

The Wildlife Land Committee, consisting of The Nature Trust, Wildlife Habitat Canada, Ducks Unlimited, and the Habitat Management Section, continued to coordinate the activities of agencies purchasing habitat for conservation purposes.

Habitat Management staff participated on the inter-agency Wilderness Liaison Committee, established to coordinate land use designations.

Appraisals and negotiations for land acquisition activities within the ministry were undertaken. A computerized land inventory system was developed to catalogue land holdings.

Contracts with The Nature Trust and Ducks Unlimited were signed and a number of joint

land use projects were administered by the Section.

The Pacific Estuary Conservation Program was initiated in November 1986, with the signing of an agreement between The Nature Trust, Ducks Unlimited Canada, Wildlife Habitat Canada, and the Ministry of Environment and Parks, in cooperation with the Ministry of Forests and Lands. The three-year program has a budget of approximately $2 million to secure and enhance critical estuarine habitats.

Planning

The Habitat Management Section coordinated the development of the Regional Wildlife Plans. The first drafts of both the species and habitat statements were completed. A committee was established to develop the Provincial Species Statements and the Provincial Wildlife Strategy.

Wildlife Viewing

A plan was initiated to undertake an analysis of opportunities for wildlife viewing, funded through the Federal/Provincial Development Agreement of the Ministry of Tourism, Recreation and Culture. The Habitat Management Section is working with the Ministry of Tourism, Recreation and Culture and with the Parks Division to develop viewing opportunities.

Wildlife viewing is one part of a "wildlife renewal package" coordinated by the Habitat Management Section. The other two parts of the package are wildlife enhancement and commercial opportunities.

Habitat Conservation Fund

The Habitat Conservation Fund received revenue totalling $1.5 million from licence surcharges and other sources. Over 90 projects to enhance fish and wildlife habitat were completed at a cost of $1.8 million. This allocation was the largest since inception of the fund in 1981, and the greatest number of projects were undertaken. In 1986, the B.C. Conservation Foundation began to act as a general contractor for selected projects.

Public Conservation Assistance Fund

The Public Conservation Assistance Fund aided 22 projects in a variety of conservation, wildlife, and fisheries areas, providing a total of $56,078 to clubs and individuals throughout the province. The agreement with Wildlife Habitat Canada to supplement the fund by an additional $50,000 was continued.

Habitat Inventory

The Wildlife Habitat Inventory Section has four main functions:

1. Mapping important wildife habitat on the basis of terrain, soils, vegetation and wildlife ecology, and providing management recommendations.
2. Setting standards for habitat evaluation and inventory in government and the private sector.
3. Developing better habitat evaluation and inventory techniques.
4. Providing specialist advice on land management.

The inventory program was assisted by funding from several different sources, including the Skagit Foundation, the Parks and Outdoor Recreation Division, the Habitat Conservation Fund, the private sector (guides and outfitters), and other branches in the ministry.

Mapping Program

Habitat and capability maps provide the basis for habitat planning, management, and protection. This year a 1:2,000,000 map of potential areas for Wilderness Area designation was developed, and 1:500,000 habitat maps were developed for regional planning and provincial planning.

Standard maps produced:

1. 1:250,000 Ungulate Biophysical — 1 mapsheet (Upper Nass).
2. 1:50,000 Ungulate Biophysical — 10 mapsheets (Nimpkish and Riske Creek areas).
3. Coastal Inventory — 1 mapping area (Tofino management area).
4. Maps for Management Area Plans — 3 mapping areas (Sheep Mountain, Caribou River, and Skagit).
5. 1:50,000 Grizzly Biophysical — 2 mapsheets (Flathead).

Setting Standards

Monitoring guidelines: standard guidelines were developed in conjunction with the Ministry of Forests and Lands Range Branch to monitor changes in habitat through habitat improvement such as prescribed burning or planting.

Developing Evaluation and Inventory Techniques

A method for mapping and evaluating grizzly bear habitat was developed and was tested in

the Flathead area. This system will provide a basis for setting seasons as well as managing and protecting habitat.

Computer mapping techniques were developed in conjunction with the Surveys and Resource Mapping Branch, and tested in the Skagit, Wells Gray and Kootenay areas. The use of satellite information was similarly utilized experimentally in the Adam River area, and the Cranbrook area.

Providing Specialist Services

Assistance was given to the Kootenay Region to assess an area south of Nelson (near Greenbush Lake) for its ability to support caribou if introduced.

Staff preparing Regional Habitat Plans were assisted in classifying habitat and assessing it for habitat management and protection.

Assessment and Planning Branch was assisted in evaluating present wildlife production for a subregional plan in the Bulkley Valley.

Technical Publications

1. Demarchi, D.A. 1986. Biophysical Resources of the East Kootenays area: Wildlife Technical Report No. 22.
2. Demarchi, D.A. and Susan Lofts. 1985. The Effects of Spring Burning on the Productivity and Nutrient Content of Favoured Shrub Species in the Southern Rocky Mountain Trench. Wildlife Technical Report No. 19.
3. Fuhr B. et al. 1986. Morice Biophysical Study 93L/S.W. Wildlife Capability Habitat. Wildlife Working Report No. WR-18.

CORE Program

Approximately 3,500 students successfully completed the Conservation and Outdoor Recreation Education program. Graduates now receive a hunter number card. A variety of improvements have been made to make the program more accessible to students and to provide support for its instruction.

Limited Entry Hunting Demand 1986/87

Species	Authorizations Available	Applications Received
Caribou	158	734
Elk	7,543	23,160
*Grizzly Bear	385	2,085
Moose	6,873	24,492
Mountain Goat	2,084	6,456
Mountain Sheep	291	3,439
Mule Deer	3,249	9,525
Whitetailed Deer	2,005	6,926
Total	22,271	75,579

* includes draw for spring 1987 hunts. Draw held in October 1986.

RESIDENT HUNTING LICENCE SALES 1984-1987

	1984/85		1985/86		1986/87	
	Number	$ Value	Number	$ Value	Number	$ Value
B.C. Resident	126,233	1,767,262	119,260	1,669,640	117,314	1,642,396
Senior Citizen	10,697	10,697	10,976	10,976	11,286	11,286
Black Bear	17,362	138,896	15,238	121,904	17,138	137,104
Caribou	1,006	20,120	1,154	23,080	1,138	22,760
Cougar	501	10,020	461	9,220	413	8,260
Deer	113,717	909,736	111,897	895,176	106,090	848,720
Elk	17,305	346,100	17,502	350,040	16,933	338,660
Grizzly Bear	957	66,990	1,003	70,210	1,041	72,870
Moose	45,306	906,120	43,891	877,820	46,526	930,520
Mountain Goat	1,887	56,610	1,768	53,040	1,781	53,430
Mountain Sheep	1,514	75,700	1,491	74,550	1,690	84,500
LEH Hunting Apps.	72,320	216,960	76,418	229,254	81,769	245,307
TOTAL	408,805	4,525,211	401,059	4,384,910	403,119	4,395,813

NON-RESIDENT & NON-RESIDENT ALIEN LICENCE SALES 1984-1987

	1984/85		1985/86		1986/87	
	Number	$ Value	Number	$ Value	Number	$ Value
Non-resident alien	3,619	$325,710	4,012	$361,080	4,321	388,890
Non-resident	660	9,240	592	8,288	635	8,890
Non-resident alien small game	325	13,000	288	11,520	411	16,440
Black bear	1,851	92,550	2,367	118,350	2,570	128,500
Caribou	404	48,480	455	54,600	495	59,400
Cougar	46	5,520	53	6,360	62	7,440
Deer	1,058	63,480	1,140	68,400	1,181	70,860
Elk	850	102,000	966	115,920	963	115,560
Grizzly bear	659	210,880	782	250,240	848	271,360
Moose	2,192	263,040	2,380	285,600	2,537	304,440
Mountain Goat	741	96,330	790	102,700	798	103,740
Mountain Sheep	412	123,600	414	124,200	394	118,200
Wolf	340	34,000	748	18,700	811	20,275
TOTAL	13,157	$1,387,830	14,987	$ 1,525,958	16,026	1,613,995

Table 6.5 SUMMARY OF GUIDED HUNTER ACTIVITY IN THE 1986/87 HUNTING SEASON

Region	Number of Active Guide Outfitters	Number of Active Assistant Guides	Number of Guided Resident Hunters	Number of Guided Non-resident Canad. Hunters	Number of Guided Non-resident Alien Hunters	Moose	Mountain Goat	Caribou	Deer	Mountain Sheep	Grizzly Bear	Black Bear	Elk	Cougar	Wolf	Upland Birds	Waterfowl	Other
1	7	18	8	3	119	0	0	0	8	0	2	119	2	0	0	1	0	1
2	4	7	0	0	14	0	1	0	1	0	0	7	0	0	0	0	0	0
3	12	18	3	0	78	4	6	0	6	5	0	29	0	3	1	6	0	1
4	36	194	3	42	673	12	80	0	60	10	17	138	205	6	0	0	0	4
5	73	129	12	1	692	271	15	4	38	5	13	50	0	1	2	46	8	1
6	57	189	7	16	821	330	173	88	5	75	47	142	0	1	32	14	0	3
7	89	334	26	49	1276	698	149	116	10	149	87	199	129	1	12	52	5	5
8	12	38	7	7	159	1	2	0	40	2	0	89	0	25	0	0	0	2
*Prov. Totals	268	892	66	118	3,767	1,316	426	208	168	246	166	773	336	37	47	119	13	17

* Some guides and some hunters were active in more than one region, hence the sum of the regional figures in some guide and hunter categories exceeds the number given for the province.

BRITISH COLUMBIA WILD FUR HARVESTS 1980-1986

Species	Number of Pelts by Fur Harvest Year					
	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
Beaver	18,166	14,895	11,815	12,666	13,297	13,668
Muskrat	30,798	27,606	21,580	25,328	14,841	10,693
Mink	5,961	4,086	4,110	4,165	3,183	2,832
Otter	747	702	429	543	673	650
Coyote	2,949	4,018	3,506	4,081	3,460	2,783
Fox	590	609	831	891	764	450
Wolf	228	194	184	186	232	156
Weasel	6,171	2,827	3,840	8,159	8,058	3,600
Wolverine	225	214	265	265	260	210
Skunk	23	34	22	60	23	55
Fisher	551	635	941	754	630	489
Marten	30,163	23,656	23,434	28,350	45,130	24,909
Lynx	3,693	5,463	6,264	2,760	1,668	1,206
Bobcat	130	231	184	215	271	134
Squirrel	176,209	33,949	79,348	87,375	31,663	29,573
Raccoon	615	1,473	667	791	978	1,337
Black Bear	358	295	382	368	364	343
TOTAL VALUE in $(Millions)	3.6	3.4	3.8	3.8	4.9	3.2

Estimates of Resident Hunter Harvest 1979 - 1986

YEAR	HUNTING	HARVEST										
	Licence Sales	Deer	Moose	Elk	Goat	Sheep	Caribou	Grizzly Bear	Black Bear	Grouse	Ducks	Cougar
1979	163088	29965	13045	1471	360	216	147	177	2731	478579	160307	150
1980	167879	36079	12486	1996	421	198	138	180	5670	306057	145549	117
1981	174088	35190	10752	1811	396	263	127	225	37[illegible]	214656	145713	106
1982	154143	34774	10906	2532	408	183	150	185	3[illegible]	258461	117564	130
1983	144669	29804	9613	3321	581	218	145	201	35[illegible]	179078	86007	120
1984	136930	32673	9196	4183	576	192	150	195	3531	133683	112150	160
1985	130236	27337	10214	3344	480	216	159	178	3061	186739	106563	100
1986	128600	29077	12076	3170	603	312	141	190	3262	238143	93664	139

Water Management Program

Objectives

The goal of the Water Management Program is to manage provincial water resources to maximize their contribution to the social and economic development and well-being of all British Columbians.

Objectives include:

1. Assured protection of licensed private rights and instream uses through allocation and regulation of the supply and use of surface water under the Water Act.
2. Reduced potential for property damage and loss of life due to flooding and erosion through runoff forecasting, snow surveys, emergency action, regulation of floodplain development, investigations for and implementation of flood and erosion protection projects, and inspection and maintenance enforcement for dykes and dams.
3. A high level of water resource quality for groundwater, fresh surface water and estuarine and coastal marine waters achieved through the establishment of resource quality objectives, water quality monitoring, watershed planning, the referral and consultative processes, and assistance in the control of nuisance aquatic vegetation.
4. An assured adequate level of water service to those supplied by privately owned utilities; regulation of water utilities, and provision of technical support including project management to funding ministries.
5. An adequate information base on the supply capability of surface water and groundwater resources through the collection, storage and analysis of data.
6. A high level of public health engineering support for the Ministry of Health through approvals and inspection of water supply sources, supply and treatment works, swimming pools and waste disposal systems.
7. A water management program which is managed cost effectively through planning, budgeting, fiscal control, program evaluation, asset control, effective communication systems, personnel system administration, administrative support services, a technical support system, and staff safety and training.

Legislation Administered

Water Act and Regulations
Drainage Ditch and Dyke Act
Dyke Maintenance Act
Libby Dam Reservoir Act
Water Utility Act
Utilities Commission Act
Land Title Act

Water Allocation and Regulation

Water Licensing

During this fiscal year, 921 applications for new water licences were received and 1,374 conditional and final water licences were granted under the Water Act, along with 252 associated permits to occupy Crown land. This is the third year that licences were issued by regional water managers as well as by the Comptroller of Water Rights, and 1,069 of the licences granted were from regional offices. At the end of the fiscal year 1,969 applications were awaiting decision, 99 in Victoria and 1,870 in the regions.

As of March 31, 1987, there were 37,963 active water licences on record, up 476 from a year previous. Of these, 1,411 licences are under review for consideration of amendments to the rights granted. Victoria administrative staff processed 2,474 licensee name or address changes. A total of 898 licences were removed from active status, either due to abandonment by the licensee, cancellation by the comptroller, or replacement by another licence.

Regional offices were responsible for the issue of 1,118 approvals under Section 7 of the Water Act during the period under review.

During the fiscal year, five appeals from orders of an engineer and 24 appeals from licensing decisions of a regional water manager were heard by the comptroller. Seven appeals from decisions of the comptroller were heard by the Environmental Appeal Board.

A total of 472 new water licensing maps affecting 2,423 water licences were produced and installed in the regional offices.

Power and Special Projects

The ministry continued to monitor the operations of public utilities, including the entities under the Columbia River Treaty, and of private companies engaged in the generation of electricity.

The monitoring of reservoir slopes where potential slides have been identified continues to be an important function. Specialist consultants are retained when necessary to advise on unusual problems. A remedial drainage works similar to that in operation at the Revelstoke reservoir Downie slide is now being constructed to stabilize a possible slide area in the Mica Reservoir.

Special projects undertaken in the year under review included reservoir clearing and debris clean-up, ice problems on the Peace River, and the seismic stability of a proposed ammonia storage tank at Kitimat.

Flood Damage Prevention

Runoff Forecasting

Forecasts of the total volume of runoff for the spring and summer snowmelt period were made for all major river basins in the province. Weather and stream-flow data were collected from many sources including the ministry's four automatic high level snow course and meteorological stations. These data were used in computer models to make short-term predictions of water levels and flow rates at various locations as required during the freshet. A warm spell at the beginning of June following a generally cool May resulted in the highest peak flow for 12 years on the Fraser River. However, peak stages were well below damaging levels.

A new remote automatic high level snow course and meteorological station was activated in the Similkameen basin with a view to provide forecasts in this area.

The flood warning system for the Squamish River was activated in the fall to collect and evaluate weather, snow conditions and stream-flow data. Although there were some heavy rains during October, conditions were such that no damaging floods were predicted or occurred.

Snow Surveys

During and prior to the snowmelt period, 1,247 snow surveys were carried out at the province's 260 permanent snow survey stations. The measurements were published in six issues of the Snow Survey Bulletin.

One additional snow pillow station was automated at Blackwall Peak in Manning Park. It was developed as a cooperative effort between Seattle City Light and Water Management Branch. The program now operates 13 automated stations, four independently and nine in cooperation with other agencies.

Floodplain Planning

A total of 1,261 zoning bylaws, rural land use bylaws, bylaw appeals and official community plans and Crown land lease and disposition referrals, and 1,253 proposed subdivisions were reviewed for floodproofing conditions. In addition, a major review of floodplain management policy was undertaken in consultation with local government authorities.

Floodplain Mapping

Floodplain mapping was completed for the following areas: Bella Coola River, Bulkley River at Quick, Cheakamus River, Lillooet River and the Village of Lake Cowichan. A total of 675 map sheets were distributed during the year in response to requests from government agencies and the private sector.

Dyke Maintenance

The purpose of the dyke maintenance program, under the Inspector of Dykes, is to ensure the safety, proper maintenance and operation of all dykes in the province except private dykes as defined in the Dyke Maintenance Act.

During 1986/87, inspections were carried out on 269 km of dykes. Approximately 82 approvals for changes to dykes were investigated. Administration and operation of the Coquitlam Dyking District by the office of the Inspector of Dykes continued during 1986/87. Technical advice and information on dyking was provided to various dyking districts and the public.

Drainage

Applications for 10 new drainage projects, having a total value of $9.5 million, were received during the second year of the new five-year Agri-Food Regional Development Subsidiary Agreement (ARDSA), bringing the total number of drainage applications to 27.

Preliminary engineering assessments were completed for 22 projects. Detailed engineering feasibility studies were completed for three projects. The Rolla Creek project was approved for construction at an estimated cost of $40,000. Nine of the projects were approved for detailed feasibility studies; and preliminary work began on gathering data and preparing terms of reference for the studies.

Dam Safety

The provincial dam safety program covers more than 2,000 storage and diversion works, of which 146 are classified as major dams. Inspection of these major structures is a responsibility of the Victoria office which carried out 126 regular and follow-up inspections during the 1985/86 fiscal year. During the same period, regional staff inspected 386 minor dams.

Using special instrumentation, the performance of 21 high-hazard dams continued to be monitored. Underwater inspections were carried out at 30 dams and a report of each inspection was submitted to the appropriate regional water manager.

Dam owners continued their review of older, smaller power projects, which may not meet current design standards, particularly with respect to spillway capacity and resistance to earthquakes. Extensive rehabilitation works have been undertaken at Alouette, Coquitlam, Stave Falls, Sugar Lake and Cheakamus dams. Comprehensive reviews of other dams, including John Hart, Strathcona, Ladore Falls and Jordan River have indicated that remedial measures are required to meet modern seismic design requirements. A program of permanent remedial measures was initiated at the John Hart Dam.

All major dam owners have now been advised to prepare operating and maintenance manuals along the lines of a guide issued by the ministry. The manuals are designed to provide reliable operating instructions and technical data on specific structures, particularly at times of staff turnover, or when operating staff is not available during an emergency. During the year all major dam owners were contacted and some 80 per cent were reported to be actively engaged in preparing manuals. Seven completed manuals were presented for approval.

Channel Clearing and River Protection Assistance

During the year, many requests for assistance with river protection works were received while some 36 projects costing a total of $344,500 were completed. Local landowners and municipalities contributed 25 per cent of this cost. Eight stream clearing projects were undertaken at a cost of $68,000. Six major dyking projects were completed under the dyking program costing a total of $3.3 million.

The construction of the replacement of the Nicola Lake Dam was completed during the year at a total cost of $1.8 million. Channel dredging is still outstanding pending an agreement on funding.

The construction of Zosel Dam under a cost-sharing agreement with the State of Washington was substantially completed at a total cost of $8.5 million. This dam controls lake levels in Osoyoos Lake and provides water for irrigation, domestic and recreational uses.

Fraser River Flood Control

This program is carried out under a federal/provincial agreement signed in 1968. As amended, it now allows for an expenditure of $161 million, shared equally by the two governments.

Expenditures to March 31, 1987, totalled $125 million while the expenditures for the fiscal year 1986/87 amounted to $5 million.

Special Studies

Investigations were carried out and reports prepared regarding a number of landslide and natural hazard areas throughout the province. There was also a continuation of monitoring of bedload movements on several debris torrent prone creeks on Howe Sound.

Resource Quality

Water Quality

Major activity was concentrated on the preparation of water quality criteria and objectives. Water quality criteria are safe levels of contaminants for various classes of water use. Water quality objectives are the criteria adapted to protect the most sensitive water uses in a specific water body. The objectives guide waste and water management, and establish a reference against which the state of water quality at a particular site can be checked.

During 1986/87, surface water quality criteria were established for molybdenum and for nitrogen, bringing the total number of completed criteria documents to five. Work is in progress on criteria for 12 other characteristics

of water quality. Provisional water quality objectives were completed for six bodies of water, bringing the total number of sub-basins for which water quality objectives have been set to 18. Work is proceeding, or is scheduled to proceed, on 16 other bodies of water.

This is the first full year of operation of a water quality monitoring agreement between the governments of Canada and British Columbia, entered into in October 1985. It provides for long-term monitoring of trends in water quality at stations throughout the province. The 23 stations at which operating costs are shared equally by the two governments, became operational during 1986/87.

Trends continue to be monitored at six lakes in the Lower Mainland and southern Vancouver Island regions to determine the future effects of acid precipitation. Nearly 800 lakes have been tested for acid sensitivity to date, including 30 in 1986.

The groundwater program provided technical input and undertook investigations and otherwise contributed to 19 environmental impact assessment studies for major developments, 13 groundwater protection studies related to natural phenomena, waste disposal and accidental spills. Under the groundwater monitoring and assessment program three reports were prepared on quality concerns.

Divers from the dam safety unit undertook 14 underwater surveys of waste disposal facilities and provided 14 reports to Regional Waste Managers.

Littoral Resources

Some $257,000 were allocated to provide 75 per cent of the operational costs of Eurasian water milfoil control projects in high-use public recreation areas of seven mainstem Okanagan Valley lakes and in Shuswap, Cultus, and Long Lakes. The area affected by this plant expanded in the Salmon Arm of Shuswap Lake and new infestations were found in other parts of the lake, probably spread by boaters. Eurasian water milfoil was also found for the first time in Mara Lake; these small infestations were controlled in December.

In 1986, about 78 lakes on Vancouver Island were examined, and the plant was found in Divers Lake near Nanaimo. Seven private ponds were treated to remove Eurasian water milfoil that had been introduced with water lilies.

In the Kootenays, small colonies in Champion Lakes were hand-pulled by divers with apparent success; the program implemented emergency control in Christina Lake where small colonies were located for the first time.

Water Quantity

Groundwater

During the fiscal year 2,498 water well records were collected from drilling contractors; a total of 3,740 water well records were completely processed.

A total of 2,232 general enquiries for groundwater information were answered and water level fluctuations were monitored in 141 observation wells located in various parts of the province. Four new observation wells were added to the network.

Under the groundwater program, 11 assessments were completed, involving groundwater supply potential and groundwater use conflicts together with six well capacity reviews for community water supplies. Over 567 copies of two publications on groundwater development and well construction guidelines were distributed on request.

Surface Water

The federal/provincial cooperative network of hydrometric stations has declined to a total of 571 due to provincial funding limitations and federal cutbacks. During the year there were 10 stations added, while 31 were discontinued.

Water Supply Projects

Supply Project Feasibility Studies

The new Canada/British Columbia Agri-Food Regional Development Subsidiary Agreement (ARDSA), signed in July 1985, provides $40 million to the development of the agricultural industry in B.C. over a five-year period. $17.5 million is available under Program 2 of the agreement to assist irrigation, drainage, soil conservation, and water conservation projects.

Feasibility studies for water supply and irrigation projects are normally initiated through requests to the Ministry of Agriculture and Fisheries for assistance under the ARDSA program. By the end of the 1986/87 fiscal year, a further 16 applications had been received, making a total of 38 water supply and irrigation projects with a total construction value of about $26 million. Preliminary engineering assessments were completed for 16 potential projects. Detailed feasibility studies were completed for two projects.

Water Supply Project Implementation

Final design and construction supervision of ARDSA projects are normally carried out or are monitored as water supply and drainage activities. Implementation of projects has been slow due to the approval process, with only six projects approved for construction at a total cost of about $500,000.

Engineering services were also provided to the Fisheries Branch for Phase 3 expansion of the Hill-Mackenzie Hatchery near Revelstoke.

Community Water Supplies

Authority to construct and operate a privately-owned water system for the supply of water to the public for compensation is provided through a certificate of public convenience and necessity issued by the Comptroller of Water Rights under the Water Utility Act and the Utilities Commission Act. In the 12-month period ending March 31, 1987, 19 applications for certificates were received. A total of 34 certificates were issued during the year.

Eighty-seven orders of various kinds were made by the comptroller and 46 new or amended tariffs were examined and accepted for filing.

Public Health Engineering

A total of 447 Final Certificates were issued by public health engineers authorizing waterworks construction. This is a responsibilty delegated by the Minister of Health. There were also 147 Certificates of Authorization for pools issued during the year under review.

Resource Management Projects

Regulation of Okanagan Main-Stem System

Inflow to Okanagan Lake was 110 per cent of normal during the freshet, which assured that there was sufficient water for all users around Okanagan Lake and downstream along Okanagan River. The normal amount of storage was carried over the winter so that Okanagan Lake was at its target level on February 1, 1987.

Nicola Lake Dam

The operation of Nicola Lake is now the responsibility of the ministry, the construction of the new dam having been completed. The lake was regulated such that the pre-freshet target level was achieved.

Vedder River Floodway

The area between the setback dykes is administered by the Vedder River Management Committee and a number of lease agreements were concluded for agricultural purposes. Monitoring of river sedimentation continued.

The dykes and floodboxes constructed under the Fraser River Flood Control Program are being operated and maintained by the District of Chilliwack.

REVENUE

Water Licensing Rentals and Fees

	Year Ended Mar. 31, 1983	Year Ended Mar. 31, 1984	Year Ended Mar. 31, 1985	Year Ended Mar. 31, 1986	Year Ended Mar. 31, 1987
POWER	$ 189,808,981	$ 172,739,369	$ 193,623,612	$ 220,183,055	$ 228,195,721
WATERWORKS	274,896	495,247	486,976	524,635	574,114
IRRIGATION	32,314	48,652	52,063	45,482	59,680
OTHER RENTALS	1,110,872	1,116,420	1,144,313	1,269,289	1,129,390
APPLICATION FEES	314,499	167,680	127,090	138,320	113,752
INTEREST	-	1,241	143	-	-
TOTAL REVENUE	$ 191,541,562	$ 174,568,609	$ 195,434,197	$ 222,160,781	$ 230,072,657

Note: - Power revenue is that received from public utilities and other major operators. Small private developments are included under other rentals.
- Waterworks and irrigation revenue is that received from local authorities responsible for distributing water to their residents. Revenue from water utilities, individual irrigation users is included under other rentals.
- Other rentals includes charges noted above plus rentals assessed for industrial, mining, domestic, storage and other purposes and for permits to occupy Crown land.

- Power rentals subject to annual indexing (1982 - 1985).
- Interest charged on overdue accounts on January 1, 1984.

Number of Active Water Licences:

As of March 31, 1983	34,520
AS of March 31, 1984	35,960
As of March 31, 1985	36,758
As of March 31, 1986	37,487
As of March 31, 1987	37,963

Air Management Program

The goal of the Air Management Program is to maintain atmospheric quality in British Columbia at a level conducive to good health and a quality environment, and to provide atmospheric information necessary for the management of British Columbia's resources.

The objectives of the Air Management Program are:

1. To establish air quality standards and to monitor major airsheds in the province to ensure the standards are maintained.
2. To develop and implement airshed management systems to ensure air quality which is conducive to good health and to maintenance of the province's natural resources.
3. To provide atmospheric data and expert services to ministry programs and other agencies.
4. To regulate weather modification.

Legislation Administered

Environment Management Act
Weather Modification Act

Air Quality Standards and Monitoring

Air quality criteria documents for sulphur dioxide, particulates and dustfall, carbon monoxide, ozone, nitrogen dioxide and fluorides were finalized and presented to the Minister for approval. The Minister has requested further options. Documents for hydrogen sulphide, chlorine and acid rain are near completion. As background information, staff prepared a report "Selected Toxic Air Contaminants — Background Information for British Columbia — Interim Guidelines" which provides information on approximately 100 air contaminants.

A pilot project for air quality objectives for reduced sulphur compounds (TRS) in Prince George was completed and interim objectives have been developed for TRS in Kitimat.

An assessment of air quality trends in the province from 1976 to 1982 has been completed. A report on Trail Air Quality has been published and one for Castlegar is in preparation.

A total of 40 ministry continuous ambient air monitors and 16 meteorological stations operated throughout the province. Monitoring at major sources of air pollution has improved, with Skookumchuk, Prince Rupert and Crofton now being monitored and Port Mellon having equipment on order. Air quality monitoring throughout the province also includes over 40 continuous monitors operated by the Greater Vancouver Regional District (GVRD) and over 30 monitors operated by industry. Approximately 18,000 laboratory analyses of airborne pollutants were conducted from samples being collected at over 500 locations throughout the province. Ministry and industry continuous air monitors were routinely audited for quality control.

The special joint government/industry monitoring project in Prince George continues to address the high level of pollutants in the area. A new program was started in Cranbrook to monitor inhalable particulates and polycyclic aromatic hydrocarbons (PAH) from residential wood-burning stoves. Meteorological stations were installed in Langley and on the new Alex Fraser bridge. Acid rain monitoring continues, with emphasis on the Strait of Georgia; the closure of federal monitoring stations, however, has reduced the number of acid rain stations to 13 from 21 and left some sensitive areas in the province without monitoring.

Vegetation monitoring was conducted at a number of locations, including Port Alice, Trail and the Lower Mainland, to determine the impact of air pollutants such as sulphur dioxide, mercury, fluorides and ozone.

Development of new environmental data management systems continues. The Continuous Air Monitoring Information System (CAMIS) now provides for the conversion of historical Environmental Quality Information System (EQUIS) and GVRD data, and will shortly be expanding to incorporate industry data. The Meteorological Information System (MIS), providing meteorological data storage and reports, continues to operate well and the development of regional access to the system will proceed in 1987/88. The Automated Air Quality Retrieval System (AAQRS) is now available for modernized monitoring stations and will automatically notify regional offices and industry when air quality levels exceed objectives in those airsheds.

Participation of program staff in joint industry/government committees monitoring coal dust levels in the province resulted in the publication of two reports, "Coal Dust Control — Recommended Practises for Loading, Unloading and Transporting Coal by Rail" and "Report on the Emission and Control of Fugitive Dust from Coal Trains."

Air Management Systems

Management systems continue to be identified in order to regulate critical pollutants in priority airsheds. Air management control plans have been prepared or are in preparation for 10 locations in the province and are being considered at a further six. As part of these plans, real-time data systems have now been installed in Victoria, Prince George, Trail, Castlegar, Kamloops, Port Alice and Squamish and are desirable at a number of sites. Further, AAQRS will automatically poll those stations with electronic data loggers, provide quality control for the data, and report instances where air quality objectives are exceeded.

The ozone control strategy for the Lower Mainland has been strengthened with new federal standards for automobile emissions effective September 1987 and the raising of tax on leaded fuel as a disincentive for misfueling. A report has been drafted on vehicle inspection and maintenance programs as a means of reducing emissions. Staff participated in a task force to review volatile organic compound emissions from gasoline marketing. A detailed inventory of all sources of air pollutants in the GVRD is being conducted. Preliminary estimates of ozone damage to agricultural crops in the Lower Mainland have been prepared. The Lower Mainland Oxidants Steering Committee is expected to submit a progress report to the Deputy Minister in 1987.

A committee of Deputy Ministers from the western provinces is pursuing an acid rain control strategy for Western Canada and it is anticipated the necessary information to develop a strategy will be available by the end of 1987. Current monitoring indicates acid deposition levels may be of concern in Vancouver, Squamish, Port Hardy and Kitimat.

In Prince George, high ambient levels of TRS continue. The Prince George Ambient Air Committee is currently attempting to establish the cause and effect relationship of the various potential TRS sources. It has recently been determined that emissions from effluent ponds may be the largest TRS source and once these emissions have been documented, further modelling and ranking of sources will be undertaken. This information will be used to evaluate various emission management options. A report to the Senior Committee is due in December 1987.

Industry, in some cases, is now able to access real-time data allowing them to react more quickly to an air pollution episode. Cominco at Trail and Kimberley and the pulpmills at Prince George, Kamloops and Castlegar use real-time air quality data to manage emissions.

Smoke from residential woodstoves, woodwaste burners and slash burning is a major concern. For wood stoves, the ministry completed an internal report, "An Investigation of Residential Wood Combustion Emissions and Control Programs in Canada and the USA," which identifies options and management strategies. A study is being conducted in Cranbrook, monitoring inhalable particulates and PAH, in order to determine if these pollutants have a health impact as well as being a nuisance. A similar monitoring program will be undertaken in Williams Lake due to the excessive amounts of smoke and flyash from wood waste burners. Discussions with the Ministry of Forests and Lands regarding the air quality impacts of slash burning has resulted in the drafting of revisions to their smoke management procedures. Staff will be monitoring for health and visibility impacts resulting from slash burning in the Okanagan in 1987/88.

The program continued to enhance its capability to model air pollutant dispersion by further developing meteorological data handling and preprocessing systems, by introducing major modifications to the dispersion model MPTER, and by obtaining the photochemical model PLMSTAR used to provide trajectory analyses of ozone events. Dispersion model analyses were carried out for a number of locations in the province including Prince George and Kitimat, as well as for various sources in the Lower Mainland.

Preliminary design of an emission inventory data base system has been completed and the development of an in-house inventory management system is expected to begin shortly. A contract to inventory all permitted emission sources in the province in 1985, except those in the GVRD, for five major and four trace air contaminants, is to be completed in the near future. Staff are involved in a federal/provincial working group to coordinate emission inventory management efforts by developing common methodologies and sharing data.

Atmospheric Data and Expert Services

The Environmental Laboratory continues to supply training for stack sampling and smoke opacity monitoring, enhancing the ministry's enforcement capabilities for air emissions. In addition, a program of emissions measurement of various industry sources continues, as well as the routine performance auditing of emission samples and an increasing program of witnessing industry sampling.

The development of interim emission guidelines for municipal incinerators in the province has been undertaken and staff are participating in the development of national emission guidelines and operational requirements for municipal incinerators. Detailed planning of emission criteria in Waste Management Plans was completed.

A draft "Source Testing Code for the Measurement of Emissions of Total Reduced Sulphur Compounds from Stationary Sources" was completed and published. Other source codes already published are those for sulphuric acid mist and sulphur dioxide and particulates.

Computerized data files containing all air quality and climatological data for the province were maintained. A meeting was held with Environment Canada to assess the transfer of the B.C. climate data file to the national archive.

The operations of 87 meteorological stations were coordinated by the program, collecting data on temperature, precipitation, wind and solar radiation, and included acoustic echo sounders operating in Surrey and Prince George.

Staff responded to 217 requests for climatological data or services from government and the public. A survey was completed assessing the suitability and effectiveness of supplying these data and services. Major applications for permits/amendments and a number of environmental reports on proposed development projects were reviewed.

Program staff provided a number of agrometeorological services to government agencies and the public. These included the preparation of a report, "Soil Moisture Deficit Calculations for South West British Columbia", as well as a number of talks given to farmers, mainly in the Okanagan, on frost protection and the use of wind machines for that purpose. Peace River climate capability for agriculture maps were field checked and will shortly be undergoing final edit as will the Creston frost risk maps. With the help of program staff, the Creston farm weather services project was begun. A paper on "Grassland Climates" was presented to the American Association for the Advancement of Science.

Weather Modification

No applications under the Weather Modification Act were received.

Waste Management Program

The goal of the Waste Management Program is to protect the environment of British Columbia by controlling the impact of polluting substances.

The objectives are:

1. To develop discharge and emission standards and, in conjunction with the Air and Water Management Programs, to develop environmental quality objectives, develop management strategies to ensure long term attainment of the objectives and monitor the environment to ensure the objectives are maintained.
2. To minimize the introduction of hazardous substances into the environment.
3. To provide adequate protection of the environment by managing discharges to air, land and water.

Legislation Administered

Waste Management Act
Environment Management Act
Litter Act

General

Emphasis continues on a joint approach by neighbouring municipalities to the satisfactory collection and disposal of solid and liquid wastes through development of Waste Management Plans. These are prepared under local initiative with the support of government agencies and public interest groups and are submitted to the Minister for approval.

In the environmentally sensitive Okanagan Valley the Minister has approved three effluent plans for Vernon, Westbank and Penticton. An eventual total of nine plans will be prepared to cover waste generation and disposal from all of the urban and rural areas.

The Greater Vancouver Regional District is implementing its approved solid waste management plan by constructing a resource recovery station for separation of refuse-derived fuel and a 210,000-tonne-per-year thermal reduction-steam generation facility. The Regional District is now preparing a liquid waste Management Plan to reflect present-day requirements for the collection and disposal of sanitary effluents, trade wastes and storm water. This will serve as the basis for more selective connection controls and for the upgrading of collection systems and the four major treatment facilities designed and built in accordance with the Rawn Report's recommendations of some 30 years ago.

Elsewhere, solid waste management plans are in preparation for Greater Victoria, Nanaimo and the Trail-Rossland-Fruitvale area of the Kootenay Boundary Regional District. An effluent management plan is also in preparation for the Sunshine Coast resort area.

The success of any program designed to safeguard environmental amenities is dependent upon the skills of waste treatment and disposal operators, and on the vigilance of regulatory agencies. A detailed analysis of the 3,237 active air emission, effluent and land disposal permits indicates that lack of compliance might produce environmentally significant results in about 10 per cent of the cases. These operations are flagged in the ministry PASS computer inventory system and surveillance activities are adjusted on a month-to-month basis. As an added check on the impact of watershed activities, long term trend analysis data are collected quarterly at 17 federal, 47 provincial and 19 jointly funded sites under the federal/ provincial Water Quality Agreement. Data is shared and is stored for retrieval on the provincial SEAM and federal ORACLE data bank systems.

Environmental Safety

Approximately 70,000 tons of special wastes are generated within the province annually. The storage, transportation treatment and disposal of these wastes need to be controlled through comprehensive regulations and enforcement. Early in 1987 the ministry released draft special waste regulations to provide standards and requirements for siting, operation and performance of special waste management facilities. In addition, a Special Waste Advisory Committee under the chairmanship of the distinguished physician Dr. David Boyes was appointed to conduct a public review of the options for a comprehensive special waste management system and further to invite and evaluate proposals for storage, treatment and disposal. Their report is due at the end of 1987. The Waste Management Act was also amended in the spring session to enhance routine controls over special wastes.

The ministry continues to operate eight special waste reception and storage facilities for the convenience of householders, schools, hospitals and other minor generators. Sufficient wastes were collected to fill 200 barrels this year. During the year 140 barrels were shipped for disposal to A & A Anderson and the University of British Columbia in Vancouver and also to the Syntath facility in Ontario. In addition 24 items of Class 4 reactive chemical wastes were destroyed by the RCMP Explosives Disposal Unit. Total annual operating cost for this service is $125,000.

The Environmental Safety Program received 716 spill reports during the year, which represents an increase of 49 over the previous year. Program staff attended 143 of these events and 43 were considered to be major spills with some threat to health or the environment. During the year there were 29 reported leaks from underground storage tanks.

Industry and business are being asked to address the prevention of spills by development of their own contingency plans. At present, plans are in preparation for 163 operations and 24 have been completed. Last year there were 128 contingency plans in preparation and 13 were completed.

Technical Services

Since January 1, 1970, the ministry has required all persons wishing to dispose of solid and liquid wastes to apply for a discharge permit. On January 1, 1971, this requirement was extended to emissions to the atmosphere. In 1972 and subsequent years the former Pollution Control Board sponsored public inquiries into waste treatment and disposal technology and practice. A series of five Objective documents were then issued for guidance in tailoring discharge Permit treatment and disposal requirements to the maintenance of acceptable environmental conditions. These documents are now more than 10 years old and are due for revision. Accordingly, a contract was awarded for an independent study of the Chemical and Petroleum Industry Objectives. This will be followed over the next two years by a review of the Agriculture and Food Processing, Forest Products and Mining Industry Objectives and those relating to Municipal-Type Waste Discharges.

Some forms of commercial endeavour lend themselves to more efficient control by compliance with equipment or operating regulations than by formal adjudication and issue of individual discharge permits. In response to the practical needs of industry, regulations are under development to cover mobile asphalt plants, small placer mining operations and wastes arising from petrochemical industry exploratory operations. The Gillespie inquiry into the aquaculture industry recommended that marine netpen culture operations should also be governed by regulations. Development of these is in progress.

Acid mine drainage difficulties are evident at five of sixteen operating metal mines in the province and at five mines now abandoned. A joint industry/government task group has been established to investigate predictive, preventive and treatment control technologies. If successful, leachate problems could be reliably anticipated and alleviated by appropriate development strategies rather than by depending entirely upon long-term mitigative treatment.

For some years the forest products industry has been using chlorophenol compounds (PCPs) as a sapstain retardant on their lumber products. Recently concerns have arisen with respect to the toxic effect this chemical has on aquatic organisms. The health effects of aerosols generated at the application stage and combustion products of waste wood contaminated with PCPs are also concerns. Two alternative chemicals, termed TCMTB and PQ8, are now under test. Neither of these compounds apparently contains the dioxin or furan contaminants which have been a further object of concern with PCP products. Procedures are now under development for the handling, application and disposal of the new commercially available replacements.

The Quesnel River Pulp Company has been undertaking a pilot study on the efficiency of a two-stage anaerobic/aerobic treatment regime on their effluents. Market demand for differing pulp grades results in an alternating two-week production schedule where thermomechanical and chemothermomechanical production methods are used. It is anticipated that this prototype treatment method will successfully treat the varying waste stream contents from both production methods to consistently meet regulatory requirements for disposal.

Program Evaluation and Data Management

Internal program evaluation activities are undertaken to ensure consistent administration and delivery of the Waste Management

Program. Each regional office was visited during the year to overview activities and to ensure that staff were familiar with current procedures and policies.

Computer program development work was undertaken to transfer historical monitoring data formerly stored on the B.C. Systems Corporation EQUIS system to the ministry's SEAM data bank. These records form an essential component of historical documentation. Development work is also underway to facilitate direct computer transfer of permittee monitoring data to the ministry's SEAM data bank.

Vancouver Island Region

Westmin Resources Ltd. is in the final stages of demonstrating a means of passively controlling acid generation and escape resulting from their mining activities. Under the innovative materials handling strategy, tailings are consolidated in a nearly impermeable structure. This procedure serves to exclude the air and water necessary for the generation of acid and the escape of dissolved metals. Tailings were diverted from Buttle Lake and, with the treatment of acid mine drainage originating from waste rock and other sources, water quality has now been restored to near-normal levels.

The Mount Washington acid mine drainage study has been completed. Recommended methods of control have been developed by a specialist consultant and are now under government agency review.

Over the past 15 years, the Capital Regional District has acted as the lead municipal agency in modernizing the major components of the metropolitan Victoria sewage facilities. The Macaulay Point outfall project was completed in 1971 to eliminate sewage discharges from Saanich and Esquimalt to the Gorge and to collect all of the discharges along the Esquimalt waterfront to the new disposal point located one mile offshore. In 1978 a similar project was undertaken at Clover Point to renovate and extend the existing outfall to one kilometre offshore. In the intervening years the City of Victoria has redirected its sewage discharges from the Inner Harbour and James Bay area to the Clover Point outfall. The combined environmental effect of the two projects has resulted in the progressive removal of the "no swimming" signs along most south coast beaches.

Agreement has now been reached among the City of Victoria and the districts of Oak Bay and Saanich to undertake the last phase of the Clover Point project. This will provide for the 1988-1990 construction of an $11 million east coast interceptor sewer. This facility will collect and redirect flows from all the remaining outfalls along the south and east coasts to Clover Point. Completion of these works will conclude the harbour and beach clean-up program in the metropolitan area.

Regional staff organized and participated in a gasoline/diesel spill scenario exercise which was dubbed "Explo 86". This was a dress rehearsal designed to test the emergency response capabilities of the Greater Victoria municipalities and service agencies. Key players included the police and fire departments, Provincial Emergency Program, Waste Management and the British Columbia Petroleum Association. The news media were also interested and provided newspaper and television coverage of the event.

Several years ago Canadian Industries Ltd. ceased the production of explosives at their James Island plant near Victoria. The company has undertaken an environmental survey to identify and quantify residual contaminants prior to submitting a decommissioning plan for the works and the site. Undoubtedly more activities of this type will occur in future as production facilities become obsolete or market conditions change.

Kootenay Region

A report titled "Trail Air Quality" was compiled and issued in 1986. The report identifies and documents ambient air quality measurements taken over the decade 1975–1985 and trends observed during this period. Sulphur dioxide emissions from Cominco operations at Trail and Kimberley result in episodes of poor ambient air quality chiefly owing to atmospheric inversions. The company responds with production cutbacks pending a change in the weather. Cominco recently has installed a recovery system to capture springwater which has been contaminated with arsenic by passage through stockpiled materials. The system diverts the water to evaporation lagoons for later recovery of metals.

Total reduced sulphur emissions arising from pulp production are a perennial source of complaints from neighbours. The Celgar Pulp Company of Castlegar is operating under a Variance Order which limits maximum hourly TRS levels. Crestbrook Forest Industries is actively studying methods of reducing TRS emissions from their mill at Skookumchuck.

Use of woodburning stoves and other similar equipment has led to a steady increase in the number of complaints about atmospheric smoke. Sampling will be carried out in the Cranbrook area to determine the severity of the problem. Public concern has also been expressed in the Sparwood area about wind dispersion of coal fines from settlement and drying ponds. This has been corrected by the installation of wetting sprinklers and by the planting of vegetative cover.

The community of Invermere has installed a ground disposal system to receive effluent from their sewage treatment plant. The new system appears to be satisfactory. The town of Creston is still working with Labatt's to alleviate treatment difficulties encountered in treating varying mixtures of municipal and brewery wastes. The town of Fernie is attempting to deal with the recurring incidence of ground and surface water infiltration into their sewerage system.

Westar Timber Ltd. has almost completed the clean-up and rehabilitation of a landfill site formerly operated by Kootenay Forest Products at Nelson. Work remaining consists of log salvage from Kootenay Lake which will be undertaken in 1988. The municipal landfill sites at Crawford Bay and Yahk have been phased out in favour of a container-haul system to the central landfill at Creston.

Lower Mainland Region

The lower mainland area is topographically constrained, but is nevertheless home to about 60 per cent of the province's population. The resulting close proximity of commercial enterprises with residential areas serves to focus public attention on environmental issues and annoyances. As a consequence a considerable amount of time is devoted to addressing enquiries and complaints.

Smoke and flyash emissions from woodwaste incinerators in the Fraser Valley have been a long-term object of public concern. As a result of intensive surveillance and enforcement activities individual mills are now paying close attention to their plant operations and the cumulative effects of all emissions have been significantly reduced.

Over the last several years Western Pulp has modernized its woodfibre mill. Air emissions now meet level A standards and air quality in the upper Howe Sound area has noticeably improved. The Canfor mill at the lower extremity of Howe Sound is still the subject of public complaints and petitions. Several meetings have been held with the company and with citizens' groups in an endeavour to find satisfactory answers. In the meantime the pulp industry is cooperating fully with the ministry in carrying out a Howe Sound air quality surveillance program. This is intended to catalogue existing conditions and assess the effects of process changes on emission levels and overall air quality.

The Greater Vancouver Regional District is acutely aware of potential effects on air quality should their new state-of-the-art refuse incinerator plant in south Burnaby not initially perform as expected. Staff from the GVRD and interested provincial and federal agencies have designed and implemented an extensive air quality surveillance program. This will monitor conditions before and after commissioning of the plant in 1988 and facilitate speedy detection and response to start-up problems if any should occur.

Regional staff are actively engaged in the ongoing activities of the Fraser River Estuary Management Program. The federal/provincial agreement which was renewed last year provides for a management and research umbrella to balance development impetus with the need to concurrently maintain wildlife habitat and to preserve water quality for fisheries and other purposes. In the latter regard, a Fraser River Water Quality Plan was published this year. In support of the Plan and in conjunction with the Fraser River Harbour Commission, staff completed the first phase of a five-year water quality surveillance program.

Waste management planning continues to receive a great deal of attention. Technical reports have been completed for the joint Regional Districts of Dewdney-Central Fraser Valley refuse plan to serve those communities located east of the metropolitan Vancouver core. Effluent management plans are also in preparation for the Regional Districts of Greater Vancouver and the Sunshine Coast.

Northern Region

Prince George air quality continued to exceed Ministry interim objectives for total reduced sulphur by a significant margin. This issue is generating interest from industry, universities, the medical profession and the public. Negotiations to improve air quality are continuing with the three pulp mills, resulting in the development of a short and long term management plan. A study to monitor emissions of TRS from mill liquid effluents is being formulated.

Interim air quality objectives for reduced sulphur compounds were established by the ministry for the Kitimat airshed. Air monitoring data collected by the pulp mill led to the development of the objectives. The report stipulates where various ambient air concentrations for TRS are to be met within the valley.

Ocelot Industries at Kitimat has completed construction of a 550-tonne-per-day ammonia plant, and the company has introduced satisfactory safeguards to protect the public from accidental spills.

Northwest Panel Board in Smithers participated in an ambient air formaldehyde gas monitoring program. The Ministry of Health is investigating the question of any link between plant emissions and health symptoms reported by local residents.

At Port Edward, Skeena Cellulose Inc. has undertaken a comprehensive biological survey of Porpoise Harbour. Ministry and Environment Canada personnel are assisting in this study to determine the impact on marine life of the discharge from the company's pulp mill operation.

The City of Prince Rupert completed the first phase of a monitoring program in the harbour to determine the effect of untreated sewage discharges. Further monitoring is required before a decision can be made on the completion of the works improvement program initiated several years ago to consolidate, relocate and/or lengthen their many outfalls along the waterfront. The city is also facing a more urgent problem of refuse disposal.

The City of Terrace is proceeding with design and construction of a secondary level sewage treatment facility. Construction of the works is expected to be complete by October 1987 and the new facilities will replace an obsolete plant.

The City of Fort St. John completed the upgrading of its south treatment system. The upgrade consisted of rebuilding the lift station and reworking the treatment lagoons.

The City of Prince George installed a filter press to dewater the digester sludge. The city also implemented a sludge composting operation to convert the dewatered sludge to a soil conditioner.

Owing to Revenue Canada investment incentives and higher international prices there has been a proliferation of gold mining properties entering the development stage. In order to assure environmentally compatible development, regional staff have reviewed 10 project proposals in the last year through the inter-ministry Mine Development Review process.

Equity Silver Mines Ltd. near Houston prepared a comprehensive assessment of environmental data collected as permit requirements over the past five years. The assessment assisted in determining environmental effects of the acid generation problem at Equity, and formed the basis for a refined monitoring program and permit amendment.

A seminar titled "Sewage Treatment in the North" was sponsored by the Waste Management Program. The seminar had speakers from municipalities, consultant firms, and the ministry. The seminar was attended by 40 people and the consensus of the participants was that the presentations were very interesting and educational.

Southern Interior Region

Air quality in the Williams Lake area has been the subject of public complaints concerning episodes of smoke and flyash fallout. The ministry has installed monitoring equipment to measure those contaminants which may have some health significance. In the meanwhile staff and the sawmill operators are working together in seeking a resolution of the more obvious problems. Periodic complaints are also received from the Merritt area about dustfall. A recent ministry survey confirmed the residents' perception of a growing dustfall problem and further work will be carried out to identify likely sources.

Monitoring of total reduced sulphur in downtown Kamloops over a period of some months has indicated frequent excursions over ambient air objective limits. Discussions were held with Weyerhaeuser Canada who reviewed process operations in their pulp plant. The conclusion drawn was that sporadic emissions from minor in-plant sources were the most probable cause of air quality excursions. The company further responded by undertaking an enhanced program of operator training and awareness. This initiative has been noticeably effective in improving Kamloops air quality and the training program will be continued.

In the Okanagan area the Tolko Industries planer mill at Lavington was the recipient of the Minister's Environmental Award for its efforts in reducing particulate emissions from their operation. An inefficient teepee burner was replaced with a new refractory lined silo type unit.

Several years ago the City of Quesnel was faced with a concurrent problem of providing increased sewerage collection services and

renovating their three sewage treatment plants. Studies carried out in conjunction with Cariboo Pulp and Paper indicated that combining domestic sewage and mill wastes was economical and provided more reliable overall treatment. The project to divert all of the city's sewage to the mill treatment plant was completed this year.

The City of Vernon continues to operate its summer spray irrigation system for the disposal of treated municipal wastewater. Off-season storage capacity was adequate over the winter of 1986/87 and deleterious effluent overflows to Vernon Creek, as had taken place in previous abnormally wet years, were not required. The waste management plan recently approved by the minister calls for construction of a new deep relief outfall into Okanagan Lake to meet such future contingencies. A high degree of treatment including nutrient removal will be provided prior to any future effluent releases.

Regional staff have taken an active role in the decommissioning of obsolete industrial plants. During the dismantling of the Ocean Falls pulp mill, potentially serious concerns regarding disposal of asbestos fibre and chemicals were identified. Secure burial was located for the asbestos and the chemicals were moved to a ministry storage bunker for subsequent disposal.

In November of 1985 Petro Canada Ltd. reported that groundwater below the old refinery at Kamloops had been found to contain hydrocarbons. As no obvious source was discovered the cause was attributed to the cumulative effects of minor spills over 30 years of refinery operation. To date some 5,000 barrels of hydrocarbons have been recovered from specially installed well points. Monitoring indicates that there has been no significant spread of contaminants beyond the original boundaries of the plant.

Pesticide Control Program

The Pesticide Control Program is responsible for ensuring that useful, federally-approved pesticides are used safely in the province in a manner that will not produce an unreasonable adverse effect on people or the environment.

The Program includes eight major activities:

1. Administering the Pesticide Control Act.
2. Establishing conditions for, and issuing permits for, various types of pesticide uses.
3. Providing study kits and offering adult extension courses on the safe use of pesticides.
4. Setting exams for, and issuing certificates to, individual pesticide applicators and dispensers who have a basic knowledge about pesticides.
5. Establishing standards for, and issuing licences to, pesticide vendors and pest control service agencies.
6. Conducting inspections and investigations of pesticide accidents and misuse.
7. Supplying the public with technical information on pesticides.
8. Conducting monitoring surveys into pesticide sale and use and into environmental contamination.

Statistics on these activities are summarized in the table following this section.

Permits

Pesticide use is regulated partly through the permit system. Use permits are required for pesticides applied to publicly-owned land, water bodies, or land that is used for forestry, transportation or public utility purposes. Special Use permits are granted for research trails involving unregistered pesticides. Restricted Use permits are granted for highly toxic or highly persistent compounds listed in Schedule 1 of the Regulations.

There were 526 applications for Pesticide Use Permits in 1986, a 30 per cent decrease over 1985. In addition, there were 50 applications for Special Use Permits and 52 applications for Restricted Use Permits in 1986. The reduction in Use Permits was partly attributed to reductions in applications by the forest sector.

Assistance in reviewing Pesticide Use Permits is obtained from regional Program Managers and members of the Pesticide Control Committee, which is represented by members from the ministries of Forests and Lands, Environment and Parks, Agriculture and Fisheries, Health, and Environment Canada. All permits are issued from headquarters through the Permits Coordinator.

Anyone who disputes the issuing of a Pesticide Use Permit can appeal to the Environmental Appeal Board. During the past year, there were appeal hearings on 30 permits. The Environmental Appeal Board added or amended conditions to four permits and withheld issuance of one permit.

Training and Certification

Training, evaluation and certification of pesticide applicators and dispensers is one of the program's major activities. It ensures that those people who handle and sell pesticides acquire knowledge of pesticide technology. The certification procedures are coordinated from headquarters. The courses are delivered, candidates examined and certificates issued by regional staff.

In 1986/87, regional staff participated in 88 adult pesticide training courses. Attendance at these courses was slightly lower than last year. A total of 3,040 certificates were issued during the past fiscal year (down 18 per cent over 1985). Of the certificates issued, 2,016 were issued to qualified applicators and 1,024 were issued to qualified dispensers.

Work continued on a major updating and revision of the Handbook for Pesticide Applicators and Pesticide Dispensers which is used as the pesticide training manual. Study kits incorporating the training manual and other publications are being updated. Extra courses were conducted to certify forest pesticide applicators because of the new federal/provincial agreement to encourage reforestation in British Columbia.

Licences

The four regional offices issued a total of 1,878 licences in 1986/87 (947 Pesticide Vendor Licences and 931 Pest Control Service Licences).

Compliance

Regional staff are involved in enforcing all aspects of the Pesticide Control Act and

Regulations. For example, an inspector may examine a vendor's storage facility or ensure all permit conditions are observed during a pesticide application. This year special emphasis was placed on inspections of pesticide storage and handling practices by the structural pest control industry and commercial mushroom growers on the Lower Mainland. Emphasis was placed on inspection of pesticide storage by commercial farmers on Vancouver Island. In total, during 1986/87, there were 1,925 inspections of pesticide service and vendor sites and 213 inspections of permit sites. As a result of these inspections, eight licences were suspended, one permit was suspended and 16 charges were laid. Numerous warnings were issued for minor infractions.

Investigations

Staff investigated 187 reports of pesticide misuse or environmental contamination by pesticides. These incidents included: alleged poisonings of humans or domestic animals, spray drift damage to vegetation, fires involving pesticides or bird or wildlife poisonings. The circumstances of several spills were examined.

One of the more important investigations occurred just before Christmas and involved poinsettia plants sold with pesticide granules adhering to their leaves. The public was warned by radio announcements and contaminated plants, which originated from two nurseries in the Lower Mainland, were taken off the market. Charges were laid for pesticide misuse.

Monitoring of drinking water for pesticide contamination was continued this year. A total of 30 well water samples were taken from five rural communities with intensive agricultural pesticide use. Samples were analyzed for three major pesticide groups: organo-phosphorous, organochlorine and acid-extractable herbicides. Five samples contained pesticide traces which were below levels considered to be a threat to human health.

Technical Information and Publicity

The branch continues to supply the public with advice on the safe use of pesticides. The program handled many inquiries about pest control and safe use of pesticides around the home. A central library of pesticide references has been established in the Victoria office.

Outside speakers are invited to lecture in the program's adult education courses, and program staff are requested by other agencies to be guest lecturers. For example, staff made presentations in lecture series sponsored by universities and colleges, forestry pest control committees, agricultural pest control committees, gardening and horticultural community groups.

SUMMARY OF PESTICIDE CONTROL PROGRAM ACTIVITIES BY REGIONS
1986/87 FISCAL YEAR

	Region 1	Region 2	Regions 3 & 4	Region 5	GRAND TOTAL
LICENCING:					
Vendor Licences Issued	180	394	235	138	947
Service Licences Issued	231	387	172	141	931
PERMITS:					
Pesticide Use Applications	84	72	184	186	526
Special Use Applications	13	16	13	8	50
Restricted Use Applications	8	42	2	–	52
TRAINING & CERTIFICATION:					
Pesticide Applicator & Dispenser Courses	22	40	6	20	88
Course Attendance	617	751	219	362	1,949
Study Kits Issued	756	1,289	691	353	3,089
Examinations Written (Courses & Home Study)	909	1,469	914	777	4,069
Certificates Issued	762	1,199	690	389	3,040
Failures	147	270	224	114	755
COMPLIANCE:					
Vendor & Applicator Inspections	390	1,092	144	299	1,925
Permit Inspections	100	39	61	13	213
Licences Susp/Revoked	0	0	0	8	8
Permits Susp/Revoked	0	1	0	0	1
Charges Laid	6	10	0	0	16
INVESTIGATIONS:					
Pesticide Accident/Misuse Investigations	33	103	41	10	187

Surveys and Resource Mapping Program

The Surveys and Resource Mapping Program continued to address its responsibility for provincial base mapping, and primary survey networks and biophysical resource mapping.

The search continued for space which could accommodate all Surveys and Resource Mapping Branch staff, equipment and storage currently scattered among eight widely separated locations throughout Victoria. Among the factors raising this requirement to an urgent level are the need to find additional storage for Terrain Resource Information Management (TRIM) data and to provide environmentally safe, efficient and secure space for new digital equipment and refinements to existing operations expected in fiscal 1988/89.

The branch initiated a series of leaflets describing its activities, products and services in popular, non-technical language. "An Introduction to Maps" was completed early in the year. Other potential themes include Geographically-based Information Systems (GIS), remote sensing, and the TRIM program. Another extension activity was preparation of a series of display panels on TRIM and parcel-based land information systems for the annual meeting of the Corporation of British Columbia Land Surveyors in Vancouver. The panels were later moved to the hallway outside the MAPS-B.C. sales office where they can be viewed by the general public and other clients.

As the provincial agency responsible for management of the North American Datum 1983 (NAD '83) redefinition and re-adjustment in British Columbia, the branch is undertaking initiatives which will bring about its orderly implementation. Among these is an instructional and educational program through the transitional period. NAD '83 coordinates for primary framework stations were received from Ottawa in July and networks for survey areas 26 to 34 covering all except the southwestern portion of the mainland and Vancouver Island were re-adjusted to new datum coordinates. The re-adjustment process also opened opportunities for some improvements to the provincial control network; for example, station names and unique identifiers were made consistent with the Control Survey Data Bank and Canadian Geodetic Surveys (CGS) records.

The new TRIM project will employ NAD '83 data exclusively for block adjustments and sheet coordinates. However, it is also recognized that a major effort would be needed to bring existing products previously referenced to the North American 1927 datum into linkage with the newer and more precise NAD '83. A director's working group established to evaluate the impact of NAD '83 on the branch examined the issue in detail and prepared a comprehensive report for the Program Management Committee.

Under the joint management of the Digital Mapping Group (a private consortium) and the branch, the TRIM 1:20 000 project will yield an abundance of feature-coded planimetry and digital terrain model data in the form of positional files which will be eminently suitable as a standard substructure or base for geographically-based information systems. The Development Unit is therefore launching new research on the application of various types of biophysical data to such themes as soil capability, land use, vegetation cover and hydrological modelling. Another avenue for the practical application of GIS is in the area of municipal mapping, where various biophysical or sociological themes can be coded into a precise, large-scale cadastral framework.

Organizational structure for management of TRIM's identified tasks of aerial photography, control surveys, aerotriangulation, digital data capture, cartographic enhancement and systems development is now firmly in place, together with a Master Project Plan for its operational phase. Draft operational plans for each task have also been completed. Because of TRIM's complexity, multi-year duration and the overlapping nature of its tasks, the master plan was structured in such a way that operational scheduling would be as simple as possible. Task coordinators have been appointed and a Technical Advisory Committee established. Also, a quality control evaluation system is being devised.

During 1986/87, 214 projects were logged into the Project Management Information System (PMIS), bringing the total on record to 522, of which 25 are cost-share projects with municipalities and regional districts. PMIS entries cover base mapping, biophysical resource mapping and miscellaneous fields such as integrated surveys, mosaic production and combined base and thematic mapping.

Base map output consisted of 499 layers (planimetric, topographic, cadastral) at scales of

1:2 000, 1:2 500 or 1:5 000 and 540 layers at 1:10 000 or 1:20 000. A total of 138 photo mosaic bases at 1:50 000 were also produced. At the end of March 1987, 34 base-mapping projects were classified as active, while an additional 45 biophysical mapping projects were also on the active list.

In the area of cadastral compilation for large and intermediate scale mapping, staff training for operational management of digital coordinate (COGO) geometry was practically completed. However, a major backlog of unprocessed cadastral data has accumulated and the need for additional hardware and software is being addressed. The expected arrival of TRIM data requiring cadastral treatment has made this need urgent.

During 1986/87, cadastral data were compiled for 229 — 1:2 000, 1:2 500 and 1:5 000 sheets and 196 sheets at 1:10 000 and 1:20 000 scale. Biophysical mapping in digital and hard copy modes continued to focus on environmental themes such as soils, vegetation, forests, physiography, water, wildlife, and climate. A total of 480 such maps were produced. In addition, graphic services were supplied for 61 projects, principally technical reports and papers.

One hundred and forty-three mosaics were constructed, with this ministry and Forests and Lands being major clients.

Surveys or reconnaissance work was carried out by in-house or contract staff in the following integrated survey areas: Kelowna, Delta, Coquitlam, Kamloops, Campbell River, Prince George, Langley, Vancouver, North Saanich, Saanich and Victoria, and data for 1030 integrated survey monuments inputted into the Survey Computations and Records Unit.

An agreement was concluded with Ottawa whereby the MAPS-B.C. sales and distribution office became the regional distributor of federal maps and air facilities charts. In the process, their retail network of approximately 60 map and chart dealers in the province was acquired. The staff of MAPS-B.C. distributed 159,265 lithographed maps with a value of more than $595,000. Over-the-counter sales accounted for more than $56,000 of total sales to the public ($308,263), and the cumulative value of all sales exceeded that of 1986 by 25 per cent.

Combined production values of air photo products (standard prints and enlargements, colour prints and enlargements, diapositives and mosaics) and reprographic (whiteprint and camera) products exceeded $652,000, of which nearly $259,000 were sold to the public and the remainder were taken by government ministries and agencies for use or resale.

Compilation of two computer-based inventories, Base Mapping and Resource Mapping, was finalized. The inventories are produced in either hard copy or computer-generated microfiche listing and together supplement the MAPS-B.C. Catalogue.

The Soils Unit continued its detailed studies on Vancouver Island, Lower Fraser Valley and Okanagan-Similkameen. Surveys on eight projects produced 120 new soils maps and 180 interpretive maps. Precise fine-tuning of soils and agricultural capability boundaries continued to be carried out for reference by the Agricultural Land Commission. On the interpretive side, maps and reports were generated for such themes as soil sensitivity to acidification, surface erosion potential, irrigation requirements, soil constraints on septic tank effluent absorption and soil drainage and raspberry suitability.

Administration and Technical Services

Financial Services Branch

Financial Services Branch provides accounting services for the ministry, including preparation of annual estimates, budgetary control, preparation and distribution of payroll data, processing of accounts payable, billing and collection of revenue, promulgation of financial policy and procedures, and the preparation of financial reports and summaries to meet internal and external requirements.

On August 14, 1986, the Ministry of Environment and the Ministry of Lands, Parks and Housing were disestablished and the Ministry of Environment and Parks was established. As a result of this reorganization the Financial Services Branch became involved in a flurry of negotiations and undertakings including:

1. Agreement with several other reorganized ministries re allocation of budgets and financial personnel. Financial Services Branch added 13 staff positions from Lands, Parks and Housing;
2. Training of Parks financial personnel in the SRB Budgetary Accounting System and transfer of Parks accounts to this system;
3. Revisions to the ministry's chart of accounts, signing authorities matrices and budget submissions; and
4. Development of a new computerized time reporting system for Parks hourly paid employees.

On November 6, 1986, the Ministry of Attorney General was charged with the administration of the Provincial Emergency Program, and the Ministry of Tourism, Recreation and Culture was charged with the administration of the historic sites of Barkerville, Fort Steele, Cottonwood House, Kilby Store, Fort McLeod and Blessings Grave. Once again the branch became heavily involved with agreements re allocation of budgets and staff and the transfer of accounting and financial responsibilities.

The ministry's Asset Control System is made up of three systems; namely, the Operations Inventory System, the Warehouse Inventory System and the Data Processing Inventory System. During the year the branch spearheaded the introduction of the Operations Inventory System to all Environment regional and sub-regional offices and all Environment branches except Surveys and Resource Mapping Branch, Wildlife Branch, Planning and Assessment Branch and the Environmental Laboratory. An extensive training program was initiated and development of a user manual and documentation of the system were started. It is anticipated that a start will be made in fiscal 87/88 to introduce the system to the remaining branches and the Parks and Outdoor Recreation Division. When the Asset Control System is fully implemented it will assist in safeguarding ministry assets and lead to economies and efficiencies in the acquisition and utilization of ministry assets.

The ministry's Project Budgeting System and related documentation and forms were refined substantially during the year. The Southern Interior Region and the Air Management Program developed and transmitted their budgets electronically using a newly introduced Project Budget Estimating System. The success of these pilot projects has resulted in an initiative to further refine and document this system so that all regions and branches can utilize it in fiscal 87/88.

Other significant achievements included further improvements to the FTE reporting system, the rewriting of the SRB Budgetary Accounting System User Manual and substantial progress on financial policies and procedures, including completion of a Payment Authorities Matrix and a Revenue Authorities Matrix, and near-completion of a revised and detailed Signing Authorities Matrix. Contracting policies, procedures and formats were refined and advice and assistance provided to branches and regions in all matters related to the contracting process.

The Statement of Revenue and Recoveries and the Statement of Expenditure by Appropriation for the fiscal year ended March 31, 1987, contained in this annual report have been prepared by management in accordance with the accounting policies adopted by the Province of British Columbia. These statements are incorporated in the combined financial statements of the Province, which are examined by the Auditor General. However, at this time the audit examination leading to the expression of an opinion on the combined financial statements is not yet complete.

MINISTRY OF ENVIRONMENT AND PARKS

STATEMENT OF REVENUE AND RECOVERIES

For the Fiscal Year Ended March 31, 1987

REVENUE:		
Water Act:		
Power		$234,121,426
Waterworks and Irrigation		630,056
Domestic, incidental use and fees		891,094
		$235,642,576
Wildlife Act fees and licences		9,381,765
Sale of maps and air photos		446,691
Pesticide licences and exam fees		78,862
Campground fees and park use permits		3,797,157
Environmental Laboratory - water test kits		6,000
Waste Management		7,152
Miscellaneous		200,801
TOTAL REVENUE		$249,561,004
RECOVERIES:		
Federal Government:		
Canada-British Columbia Joint Development Act	$2,553,229	
Pacific Rim Park	8,000,000	$ 10,553,229
B.C. Hydro:		
Canada-British Columbia Hydrometric Agreement	$ 200,165	
Fisheries and Wildlife	375,205	575,370
TOTAL RECOVERIES		$ 11,128,599
SPECIAL PURPOSE FUND:		
Habitat Conservation Fund--Fees	$1,409,320	
--Other	138,253	$ 1,547,573
TOTAL REVENUE AND RECOVERIES		$262,237,176

MINISTRY OF ENVIRONMENT AND PARKS

STATEMENT OF EXPENDITURES BY APPROPRIATION

FOR THE FISCAL YEAR ENDED MARCH 31, 1987

Vote No.	Description	Appropriations	Actual Expenditures
25	Minister's Office	$ 211,255	$ 209,238
26	Resource and Environmental Management	95,994,149	92,921,181
57	Ministry Operations (L.P. & H.)	31,254,462	30,516,532
	Statutory -		
	Financial Administration Act		
Sec. 15	Extinguishment of Debt	3,225	3,225
Sec. 22	Indian and Northern Affairs	38,228	38,228
Sec. 22	Nicola Lake Dam	450,000	450,000
Sec. 22	Georgia Pacific Corporation	47,000	47,000
Sec. 22	Kokanee Creek Park	2,509	2,509
	Special Fund - Wildlife Act - Habitat Conservation Fund	2,226,000	1,951,063
		$ 130,226,828	$126,138,976

Personnel Services

Personnel Services provides a wide range of human resource management services to the ministry, including recruitment and selection, salary administration, job and organizational analysis, contract administration, collective bargaining, employee relations, staff development, safety and records administration.

The amalgamation of the Parks and Outdoor Recreation Division into the Ministry of Environment had major impacts on the branch. Considerable effort went into merging policies, procedures, systems and office equipment and accommodation.

Recruiting activity was normal during the year. The annual recruiting drive for junior level conservation officers attracted 180 applicants, of which 60 wrote a qualifying examination and 122 were eventually selected and placed on the eligibility list.

As usual, classification activity during the year continued at a very high level. The format of both Ministry Classification Committees was changed so that only line managers have voting rights. Additionally, the committees were expanded to give Parks representation. A strong start was made by the Management Classification Committee in reviewing all management level 1–5 positions within the Ministry. Other noteworthy events include completion of the benchmarking of technical positions by the Ministry Scientific and Technical Classification Sub-Committee; and the resolution of a long-standing problem involving draughtsmen employed in Water Management.

Labour relations activity was at a high pitch during the first part of the year with the negotiation of two collective agreements, planning activities and the threat of strike action.

During the year, the branch was given the green light to proceed with a new ministry-wide computerized record system for employee records, leave management, safety and staff development and training. This project was well underway with some employee records on computer by year end.

The Staff Development and Safety Section continued to focus on in-house and decentralized training programs. In-house training accounted for 66 per cent of the total training in the ministry. This represents an eight per cent increase in in-house training activities over 1985/86.

Compared to 1985/86, total tuition costs were reduced by 37 per cent while the number of training days increased by 52 per cent. On the average, 1.42 per cent of employee time (3.4 days per employee per year) was invested in training, with a tuition cost of $68 per FTE.

New ministry training initiatives for 1986/87 included Safety Management for Supervisors, Negotiation Skills, Performance Planning and Review, Electrofishing, Chemical Immobilization of Wildlife, Instructor Recertification in Bucking, Falling, Chainsaw Operation, Communication Skills, Introduction to Supervision and Wilderness Survival Training.

Direct job accident costs for 1986/87 were $68,485 plus 605 person days lost. Safety Committee Training and Safety Management for Supervisors training was provided in continued support of region and branch safety programs.

Central Services Unit

The function of Central Services is to meet the accommodation requirements of the ministry, administer the ministry vehicle fleet, provide for telecommunications service, insurance, mail and courier services, warehousing, operational control of ministry assets and other support services.

The unit's accomplishments during the past year include:

1. Accommodation of 1,600 personnel;
2. Processing registration and insurance for 800 motor vehicles and other mobile field equipment;
3. Administering 257 requests for telephone and radio equipment;
4. Reviewing operational use of ministry field equipment and re-assigning assets as required;
5. Coordinating the disposal of surplus;
6. Completion of a pilot project that will lead to ministry-wide conversion to the government records management system;
7. Processing 1.1 million pieces of incoming and outgoing mail; and
8. Administering the postal charge-back system on behalf of the ministry.

Planning and Assessment Branch

The mandate of the Planning and Assessment Branch is to assist the ministry's executive in coordinating policy and technical issues involving several program interests. The branch achieves this by:

1. representing the ministry on inter-agency committees and task groups,
2. preparing environmental management plans,
3. preparing integrated analysis of major project development proposals, and
4. undertaking economic analyses for programs.

Inter-Agency Activities

The branch was involved in 19 projects associated with policy coordination and liaison with other ministries. These activities covered a wide range of issues such as assisting in the development of wilderness policy following the release of the Wilderness Advisory Committee's report, continued coordination of environmental reviews of roads, transmission lines and port developments required to service proposed mining developments, and preparing economic policy analyses for Cabinet reviews of the provincial economy. New issues that required branch involvement included coordinating the ministry's involvement with finfish aquaculture in the province by preparing the ministry submission to the Gillespie Finfish Aquaculture Inquiry, and the ministry's response to the inquiry's report in consultation with the Fisheries, Water and Waste Management Programs. The branch was appointed to represent the ministry on the Inter-agency Aquaculture Steering Committee, has coordinated ministry input to coastal resource inventory studies led by the Ministry of Forests and Lands, and has steered the development of environmental monitoring systems for aquaculture pursuant to recommendations of the inquiry.

The branch has supported the Wildlife Program in establishing ministry priorities for acquiring sensitive coastal habitats under the Pacific Estuary Conservation Program, and prepared a resource analysis and management strategy for the Tofino Wetlands on the west coast of Vancouver Island. Branch staff continued their representation on the Sea Use Coastal Advisory Board, the Marine Traffic Advisory Council, and the Pacific Advisory Committee on Oceanography.

It also continued to perform a key analytical and support role in the implementation of inter-agency estuary management plans. Included were the implementation of the Cowichan Estuary Management Plan, the first Environmental Management Plan established by Cabinet order under the Environment Management Act, the delivery of a coordinated project review process for the Fraser Estuary Management Program, and refinement of proposed area designations in support of the Squamish Estuary Management Plan.

The branch drafted ministry-wide policies for mitigation and compensation, evaluation of major projects to assess compliance with both regulated and unregulated terms and conditions for their operation, and procedures for protecting coastal wetlands. A draft policy for allocating instream flows among competing uses was also prepared and is now being implemented by the Water and Recreational Fisheries Management programs. The branch also assisted the Recreational Fisheries Program in developing its policy on quality fisheries and associated economic incentives to control angling activity on the Dean River.

Other coordination projects included representation on the research advising committee for the Canadian Council of Resource Ministers to complete an initial draft of an inventory of current research projects for environmental protection and initiate joint-venture funding of new research projects involving several provincial and federal agencies. The branch led a ministry approach to coordinating ministry input to Timber Supply Area plans prepared by the Ministry of Forests and Lands with a view to developing a protocol agreement early in fiscal 1987/88. It also provided input to the Cabinet policy on lifting the uranium moratorium and compensation for guides and trappers whose activities were affected by the NE Coal developments.

In response to Cabinet reconfirmation of its policy not to compensate farmers who suffer damage due to wildlife, the branch, in conjunction with the Wildlife Program and Kootenay Region, coordinated an analysis of wildlife damage to ranching properties in the East Kootenays as part of a two-year program to reduce damages if they are found to be substantial.

Finally, the branch played a more active role in guiding the development of ministry information systems. It coordinated the reviews of joint ministry information needs for watershed and coastal resource management with a view to developing integrated

information systems to assist programs and regions.

Planning Activities

Planning activities continued at all levels of the ministry from policy to operations. At the program level, the branch completed a corporate plan for the Environmental Laboratory, now being implemented, and began work on program plans for Surveys and Resource Mapping and for the ministry's Administration and Technical Services component. It also finalized a strategy for controlling vehicle emissions to improve air quality, particularly in the Lower Mainland.

At the regional level, the branch coordinated the drafting of regional wildlife management plans and associated species statements for the major big game species. Work was begun on the provincial wildlife management plan, which will integrate the main strategies emerging from the regional wildlife and associated habitat plans.

At the sub-regional level, plans were completed for the Cowichan-Koksilah watershed, Thompson-Bonaparte area, and initiated for wildlife management in the Bulkley Valley and Nechako areas. Water and related land use plans were also begun for Shuswap Lake, Oyster River, Fishtrap/Pepin, Okanagan tributary streams, and the West Arm of Kootenay Lake. All these plans provide direction to all Ministry programs for managing environmental resources to meet stated program objectives.

At the operational level, plans were completed for the Dean River, fish management in Kootenay Lake, and for water quality at the Summerland fish hatchery. Plans continued for managing wildlife to offset habitat losses caused by the east Kootenay coal mine developments. The branch also coordinated the review of 26 official community plans by ministry programs for input to the Ministry of Municipal Affairs.

The branch has perceived the application of planning as providing a policy context for environmental assessment of major project proposals. An example of this approach was undertaken on the Nechako River, where Alcan has proposed expanding its existing power facilities in accordance with water rights granted in 1950. The branch prepared a technical analysis of water demands, water use and conflicts between alternative levels of power development and instream flow regimes for fisheries management. During the year, Alcan initiated proceedings in the B.C. Supreme Court to secure rights to control water diversions over those contained in the Federal Fisheries Act. The branch coordinated preparation of technical briefs for the ministry for this court case. At the end of the year, negotiations were begun between Alcan, the federal Department of Fisheries and Oceans and the ministry in an effort to avoid a costly court case.

Socio-Economic Analysis

The branch provided economic and social analysis for a range of ministry programs during the year. For the Wildlife Program, a summary of the value of wildlife to British Columbia was completed, projected hunting demand for moose and deer was estimated for most of the province, and a survey of the trapping industry was begun. Various specific economic analyses of wildlife resources were undertaken to help resolve land use conflicts such as those along the Coquihalla Highway.

For the Recreational Fisheries program, an economic analysis of the proposed Inonoaklin fishway was completed and staff assisted regions in organizing public meetings to discuss this analysis. As a result of this analysis, the fishway was not developed, but the hatchery facility at Hill Creek was expanded. An economic analysis was undertaken of the fish hatchery on the reservoir at Site One — B.C. Hydro's project situated below the Bennett Dam on the Peace River. Staff also assisted in the evaluation of fisheries impacted by the proposed Sage Creek project as part of the International Joint Commision review of the impacts of that project on water and associated resources in the Flathead River in Montana. The branch also undertook an economic assessment of user fees for the Dean River fishery and continued to provide economic input to the criteria for allocating hatchery-reared fish across the province.

For the Waste Management Program, the branch analyzed the application of discharge fees to waste discharge permits and the economic advantages of expanding ambient monitoring in water and air environments. It also assisted in developing public information projects in support of the implementation of water quality improvements for the Okanagan Lakes.

For the water program, the main economic activities were associated with providing criteria to allocate water between instream and consumptive uses and the application of these criteria to the Nechako River management plan.

Project Assessment Activities

The provincial mine development review process experienced its busiest year in its

ten-year history with 18 mining projects under review. Most of these mine proposals involved precious metals, generally in the northwest region of the province. The branch coordinated ministry reviews for Greenhills expansion in the southeast, and Mt. Klappan in the northwest (coal), Kutcho Creek (base metal), Nickel Plate, SEREM, Golden Bear, Silbak Premier/Big Missouri, Johnny Mountain and Consolidated Cinola (gold).

The branch continued to represent the ministry on both the provincial Reclamation Advisory Committee, and the government/industry Research and Technical Committee on Reclamation, and was appointed to represent the ministry on the government/industry Acid Mine Drainage Task Force. The staff played important roles in organizing the 10th Annual Reclamation Symposium and an International Symposium on Rock Drains.

The branch was involved in coordinating ministry assessments, responses and positions on a variety of industrial, transportation and energy projects, including offshore hydrocarbon exploration, Fraser-Thompson corridor transportation management, Ocelot Ammonia, Remmington Gas, the Vancouver Island Highway and Queen Charlotte Islands low level hydroelectric generation. Branch staff continued to represent the ministry on the Roberts Bank Environmental Review Committee and the CNR Twin Tracking Environmental Steering Committee, and completed a role as Scientific Advisor to the Queen Charlotte Islands Coastal Mapping Study on behalf of the Federal Environmental Studies Revolving Fund. In addition, the branch prepared budget requirements for management of direct and indirect impacts to ministry programs resulting from the construction and operation of the Coquihalla Highway, and coordinated the updating of environmental actions and costs resulting from the Site C Hydroelectric Inquiry recommendations.

The branch also conducted a variety of general tasks in relation to project assessment. On behalf of the Ministries of Industry, Science and Technology and Economic Development, branch staff produced a compendium of environmental considerations associated with the possible development of selected industrial sites throughout the province, and provided input to Environment Canada's port/industrial site suitability analysis for coastal British Columbia.

Environmental Laboratory

General

During 1986/87 the Environmental Laboratory provided chemical and biological analytical services (including fish bioassay) to the ministries of Environment and Parks, Forests, Agriculture, Health, and Finance. It also provided analytical services to Crown corporations such as B.C. Hydro and some municipalities. Routine tests conducted at the laboratory totalled 2,428,686 workload units (one workload unit is one minute of analytical time). In addition, project time for method development and sample management system resulted in 341,878 workload units. The laboratory also carried out 82 legal analyses resulting in seven court appearances. Under the program jointly managed by the Environmental Laboratory and Ministry of Health, 520 public water samples were analyzed. Other accomplishments during the year were the completion and acceptance of a new corporate plan, development of 25 new methods, purchase of a gas chromatograph mass spectrometer and an inductively coupled argon plasma.

Special Services Division

Special Services Division provides services in the areas of air quality monitoring and quality assurance.

The Air Quality Sections continued to provide both laboratory analyses and a data reporting service for ministry air quality monitoring within the province. Some 40 continuous air monitors were operated and approximately 20,000 laboratory analyses of air related samples, including precipitation, were carried out. Project work authorized by the Waste Management Branch either continued or was initiated in the specialized areas of TRS monitoring, inhalable particulate monitoring and toxic organics. In addition, courses leading to ministry certification were given in both opacity reading and ambient air monitoring. Report preparation and laboratory analyses were carried out for a total of 20 stack surveys.

The Quality Assurance Section carried out 24 internal audits of laboratory test methods. Participation in various inter-laboratory comparison studies was continued, including studies for precipitation and surface waters for the federal/provincial committee dealing with Long Range Transport of Acid Pollutants (LRTAP). The result of both internal and external audits were summarized, for the first time, in a Laboratory Performance Report. Performance audits of 60 continuous TRS and SO monitors (ambient and stack) operated by industry were carried out. Periodic audits of the 40 ministry continuous monitors were similarly carried out.

The following reports were completed in 1986/87:

1. Laboratory Performance Report, 1986.
2. Source Testing Code for the Measurement of Emissions of Total Reduced Sulfur Compounds from Stationary Sources, 1987.
3. Grans Titration: Inherent Errors in Measuring the Acidity of Precipitation (Atmos. Env 20, 1507 '1986').

Operations Division

The Operations Division continued to provide chemical services for inorganic and organic analyses and biological services for taxonomic identifications, bioassays and microbiological testing of water. During 1986/87 the Operations Division completed 1,587,574 workload units of routine and special analyses tests.

Method comparison and quality assurance work associated with the Federal/Provincial Monitoring Agreement was continued. The staff of the Operations Division took an active part in organizing the Laboratory/Field Workshop which was held at the Environmental Laboratory in December 1986. Rewriting of the laboratory's manuals was also initiated during this fiscal. To date, the first draft of the Biological Procedure Manual has been completed.

The inductively coupled plasma spectrometer purchased this fiscal is a replacement instrument with the capability of sequential and simultaneous element analyses. The gas chromatograph/mass spectrometer will enhance the analytical capability of the Environmental Laboratory in the field of organic contaminant testing. It will be used for confirmation and identification of organic constituents. The instrument has been installed and training sessions were attended by staff. This instrument has already proved useful in confirming the presence of pesticides where the routine analytical test left doubt.

Completed projects during the fiscal year included the following:

1. Determination of hexazinone and its three metabolites in water.
2. Determination of formaldehyde in air related samples.
3. Marine sediment bioassay studies utilizing the burrowing clam Macoma balthica to measure acute and chronic toxic conditions.
4. Development of membrane filter techniques for the isolation and recovery of E. Coli and Enterococci in waste and fresh waters for the assessment of the sanitary quality of waters.

Computing Services Branch

Computing Services Branch is responsible for providing computing and systems service to ministry programs in support of program delivery.

In the 1986/87 fiscal year, Computing Services delivered several new systems to the ministry including:

1. Personnel Management Information System, which provides a distributed personnel system for the ministry and satisfies the requirement of the Government Personnel Services Division for electronic transmission of position and leave data.
2. A system for the Environmental Laboratory to automatically capture data from instruments was initiated. This project is anticipated to be complete in fiscal 1987/88.
3. Watershed coding system based on digitized base maps.

Associated with these and other smaller systems were enhancements to the ministry's communications network and VAX mini-computers.

The freeze on system activities initiated in the 1985/86 fiscal year continued into this year and prevented the ministry from implementing several planned projects. In addition, senior branch staff changed late in the year, with resulting difficulties in a time of change.

To assist the ministry in increasing its productivity by using data processing tools more effectively, an end-user support and training group was established within the branch.

Conservation Officer Service

The objectives of the Conservation Officer Service are:

1. To promote compliance with environmental legislation through public education, public awareness and public involvement;
2. To enforce environmental legislation through investigation of possible violations and prosecution where warranted;
3. To respond appropriately to public requests for assistance regarding problem or nuisance wildlife in order to protect private property and/or ensure public safety; and
4. To provide technical support to other ministry programs as required.

Accomplishments

The Conservation Officer Service consists of 86 field officers, 13 senior conservation officers, five regional conservation officers and five Victoria headquarters staff.

Statistics 1986	1985 (Increase/ Decrease)
3,465 violations reported by public	+ 0%
4,446 violations found by conservation officers	− 15%
3,389 charges	− 1%
2,606 convictions registered	+ 12%
837 warnings issued	−241%*
1,017 cases unsolved	− 0%
$403,026 fines levied	+ 68%

* The reduction in warnings is due to a change in reporting procedure. Previously, warnings included verbal and written. As of 1986, written warnings only are included.

The Conservation Officer Service is involved in the following four programs:

Wildlife Program

The following acts are enforced:
Wildlife Act
Firearm Act
Migratory Birds Convention Act
Game Export Act

Conservation officers spent 51 per cent of their total time on wildlife enforcement duties and contacted 32,222 resource users.

Statistics 1986	1985 (Increase/ Decrease)
2,420 violations reported by public	− 1%
2,692 violations found by conservation officers	− 7%
568 violations unfounded	+18%
3,425 total actual violations	− 5%
1,927 charges	−14%
1,466 convictions	+ 1%
563 warnings issued	−42%
776 cases unsolved	−13%
$243,997 fines levied	+59%

The violation rate for hunters was 12 per cent (12 out of every 100 hunters checked in the field were found to be in violation of an Act or Regulation). This rate is 1 per cent lower than 1985.

Wildlife Control

Conservation officers spent 15 per cent of their time handling nuisance or dangerous wildlife complaints and responded to 1,448 of 7,683 complaints from the public in this regard, as follows:

	Complaints Received	Complaints Acted On
black bear	2,868	1,106
grizzly bear	96	31
cougar	316	84
wolf	517	63
other	3,886	164

Fisheries Program

These Acts are enforced:
Federal Fisheries Act
Fisheries Act (Provincial)

Conservation officers spent 21 per cent of their operational time on fisheries habitat protection duties and contacted 45,402 resource users.

Statistics 1986	1985 (Increase/ Decrease)
592 violations reported by public	+ 3%
1,447 violations found by conservation officers	− 34%
1,288 charges	+ 7%
1,040 convictions registered	+ 26%
273 warnings issued	−359%*
176 cases unsolved	0%
$142,894 fines levied	+111%

* The reduction in warning is due to a change in reporting procedure. Previously, warnings included verbal and written. As of this fiscal year, written warnings only are included.

Waste Management Program

These acts are enforced:
Waste Management Act
Environment Management Act
Litter Act

Conservation Officers spent a total of two per cent of their operational time on the enforcement of Waste Management legislation.

Statistics 1986	1985 (Increase/ Decrease)
122 complaints reported by public	− 36%
84 violations found by conservation officers	+171%
53 charges	− 9%
9 convictions registered	− 85%
6 warnings issued	−400%*
42 cases unsolved	0%
$4,900 fines levied	− 67%

* The reduction in warnings is due to a change in reporting procedure. Previously, warnings included verbal and written. As of this fiscal year, written warnings only are included.

Water Management Program

This program enforces the Water Act.

Conservation officers spent a total of .50 per cent of their operational time on enforcement of the Water Act.

Statistics 1986	1985 (Increase/ Decrease)
47 complaints reported by public	0%
28 violations found by conservation officers	+133%
0 charges	−100%
0 convictions registered	−100%
0 fines levied	−200%

Other

Conservation officers, in the course of their duties, lay charges under various other Acts, including the Criminal Code. In the year 1986, 32 charges were laid under other Acts resulting in 16 convictions with a total of $2,100 in fines being levied.

Administration

Administration matters consumed three per cent of their overall time, representing a one point reduction over the previous year.

Prevention

Conservation officers spent a total of 4,461 man-hours on community information and education related activities, representing three per cent of their time.

Training

A three-week enforcement training course was held in March 1986 at the B.C. Police Academy for 20 conservation officers and four parks officers. This course is for new conservation officers and is designed to prepare them with the knowledge and skills required for conservation enforcement duties. Two cross-cultural courses were held for a total of 40 conservation officers and 10 other ministry personnel. As well, training was provided for 20 conservation officers in how to effectively deal with hostile individuals. These seminars are worthwhile experiences and will be given to all conservation officers.

A Conservation Officer Service Investigator's Course has been prepared and will, eventually, be given to all conservation officers beginning in the new fiscal year. This is an advanced course with emphasis on conducting intensive and extensive investigations, statement taking and interviewing.

Information Services Branch

Introduction

Information Services Branch provides comprehensive communications and public affairs services to the ministry and to the public. The branch is responsible for strengthening links with the public and for developing understanding and support for the ministry's major programs.

To meet this responsibility Information Services provides information about the ministry's programs and services to the public, the media, and special interest groups. The branch coordinates release of information to the media, develops and distributes material to the public and special interest groups on ministry programs and activities, and provides planning and technical support to the ministry's executive in the area of public relations and communications.

Specifically, the branch is responsible for the following:

1. Planning and implementing communication strategies on ministry initiatives and priorities;
2. Researching and drafting news releases, articles and pamphlets;
3. Coordination of ministry advertising and media relations;
4. Developing and providing environmental education programs and materials;
5. Maintaining a library and reference service for ministry staff and members of the public concerned with environmental issues;
6. Developing or coordinating preparation of audio-visual programs, films, videos and public exhibits; and
7. Supporting regional and headquarters staff in their communication needs.

Media Relations

During 1986/87, 61 news releases and information bulletins were issued and six news conferences were conducted on subjects of environmental interest. The branch also continued to serve as the central point of contact for inquiries about ministry activities and programs from news media and the public.

The ministry's Zenith number for reporting spills of dangerous goods was the subject of a media campaign designed to create an immediate and province-wide awareness of this new service.

Education

Two new environmental and conservation education programs — Resources and Wastes and Project WILD — were introduced to young people across B.C.

Resources and Wastes is a program developed by the ministry for secondary school students. It is designed to create an understanding of how individuals, business and industry can reduce waste and promote resource conservation and recovery.

Project WILD is an internationally acclaimed program developed primarily for elementary grades. It emphasizes awareness, appreciation and understanding of wildlife and natural resources.

Publications

Sixteen new publications aimed at a general audience were produced and 56 publications were reprinted. The branch also reviewed and processed 23 technical publications on behalf of ministry programs (see list following).

Among the notable new publications were:

1. The secondary school education package on waste management, "Resources and Wastes";
2. "Wildlife Management in British Columbia", a booklet explaining the principles and policies behind the provincial wildlife program;
3. "An Introduction to Maps", a folder explaining the selection and use of MAPS-BC products and where to obtain them;
4. A brochure introducing the British Columbia celebration of Wildlife '87, the Canadian Conservation Centennial; and
5. A brochure explaining the implementation in the province of Project WILD.

The branch continued to promote improved communication within the ministry through publication of the quarterly staff newsletter "Environment News". An editorial policy emphasizing profiles of both program and staff activities was well received by ministry employees.

Library

The use of library services, especially the interlibrary loan service, increased again this year.

The Library Committee has identified three priorities: improving access to the library collection, strengthening the library's reference and research capability, and promoting awareness of the library's services.

To help the library meet these goals, the library has joined with approximately 15 other government libraries to purchase Sydney Development Corporation integrated library software. This new software will allow automation of the cataloguing, acquisitions, circulation and serials functions. It will also provide on-line access to the library catalogue from other terminals in the ministry.

Special Projects

The branch was heavily involved in communications activities for launching Wildlife '87, the centennial of wildlife conservation in Canada. The branch assisted the Wildlife Centennial Society of B.C. through the development and production of printed materials, displays, and the planning and execution of other promotional activities, including a school poster project which resulted in the creation of posters by some 3,000 young people on the theme "Joining Hands in Conservation".

The branch also worked with planning and program staff on a number of assignments relating to special projects of the ministry. These included the development and implementation of a public information strategy for the Okanagan Water Quality Control Project and a public consultation program leading to development of a province-wide floodplain management policy.

The branch provided support for several major exhibits and displays across the province, including a display on the Wilderness Advisory Committee study areas for the visit to Vancouver of the World Commission on Environment and Development.

Parks and Outdoor Recreation entered the ministry with the 75th anniversary celebration activities for BC Parks well underway, and plans were initiated with parks staff for a variety of follow-up activities for the 1987 camping season.

The Minister's Environmental Awards for 1986, presented at a ceremony in March, recognized the contributions of a citizen's group, a municipality, and two forest industry companies. The award recipients included The Save Swan Lake Society of Dawson Creek, the City of Prince George, Tolko Industries Ltd. (Vernon), and Western Pulp Ltd. (Squamish).

The Ministry of Environment and Parks published or reprinted the following information brochures and technical and scientific reports in 1986/87:

Environment Information Brochures and Publications

Ministry of Environment Annual Report, 1985/86
Resources and Wastes
Wildlife Management in B.C.
Observe, Record, Report
Preventing Raccoon Problems
Limited Entry Hunting
B.C. Hunting Regulations Synopsis, 1986/87
Fraser Valley Special Licence Hunting Area brochure
B.C. Freshwater Sport Fishing Regulations Synopsis, 1986/87
Floodplain Management Discussion Paper
An Introduction to Maps
B.C. Trapping Regulations Synopsis, 1986/87
B.C. Wildlife Centennial brochure
Project WILD brochure
Guide Outfitters in B.C., 1987/88
Ecology (R)
Moose Antlers (R)
Wolf Management in B.C. (R)
Coastal Cutthroat Trout in B.C. (R)
Steelhead Trout in B.C. (R)
Safe Pesticide Use (R)
CORE (Conservation and Outdoor Recreation Education) (R)
Garbage is Resource Full (R)
Montague Harbour Provincial Marine Park
Camping, Docking and Wilderness Shelter Fees (R)
Regional Park brochure series (5 publications) (R)
Special-Use Park series (3) (R)
Wilderness/Backcountry Park brochures (20) (R)
High Profile Park brochures (11) (R)
In-Park brochures (4) (R)
Outdoor Recreation series (3) (R)
Robson Bight Ecological Reserve (R)

Scientific and Technical Reports

B.C. Mariculture Newsletter (5 issues)
Salmon Pack Bulletin (22 issues)
Snow Survey Bulletin (6 issues)
Snow Survey Measurements Summary, 1935/1985
Report of the B.C. Survey of Non-hunting and Other Wildlife Activities for 1983

Values and Characteristics of Freshwater Angling in B.C.
Effects of Harvesting and Transporting Conditions on the Quality of Farmed Chinook Salmon
Development and Use of Artificial Cultch Suitable for Off Bottom Oyster Culture in British Columbia
Pollution Control Objectives for Municipal Type Waste Discharges (R)
Soils of the Okanagan and Similkameen
Methods for Setting Hatchery Produced Oyster Larvae
Fisheries Production Statistics of B.C.
Biophysical Resources of the East Kootenay Area
Aquatic Plant Management Program
Users Guide to the Heirarchical Watershed Coding System for B.C.
Trail Air Quality
Kechika Enhancement Project of Northeastern B.C., Wolf/Ungulate Management Annual Report
Muskwa Wolf Management Project of Northeastern B.C., Annual Report
Cowichan Estuary Management Plan
Morice Biophysical Study
Caribou Habitat Use on the Level Mountain and Horseranch Ranges of B.C.
Biophysical Soil Resources and Land Evaluation of the North East Coal Study Area 77/78 Jarvis Creek-Morkill Area
Rationale for Wolf Control in the Management of the Vancouver Island Predator/Ungulate System

Environmental Appeal Board

The Environmental Appeal Board operates under the provisions of the Environment Management Act (1981). Its purpose is to hear appeals to decisions made under environmental legislation. The board, appointed by Cabinet, consists of a chairman and a sufficient number of board members to deal with appeals expeditiously. During the period covered by this report (1986) there were 24 board members.

Seventy-three licences, permits or orders to the Director of Waste Management Branch, the Deputy Director of the Wildlife Branch, the Comptroller of Water Rights and the Administrator of the Pesticide Control Act were appealed in 1986, compared to 50 the previous year. These appeals resulted in 39 hearings (oral 34, written 5), compared to 33 in 1985. There were 97 appellants (61 in 1985), some of whom appealed the same licence, permit or order.

Of the appellants, 15 won their appeals, 50 lost their appeals and ten abandoned their appeals before hearings were convened. Seventeen appellants had their appeals rejected for various reasons (mostly for late filing), and five licences, permits or orders were cancelled before the hearing could take place.

One of the board's decisions was appealed to the Supreme Court of British Columbia for a judicial review. Following this review, the Supreme Court ruled that the board did not have jurisdiction to hold hearings by written submission. The procedural regulations of the board have since been amended by Order-in-Council to allow the written submission process to be used in certain instances.

Two other appeals are still in process, one to the Supreme Court of British Columbia and the other to the Lieutenant Governor in Council.

In addition to the appeal activities of the board, one board member has also taken part in two variance investigations for the Minister of Environment and Parks.

The following is a breakdown of the results of appeals conducted in 1986 in relationship to the four ministry programs they concerned:

Wastes Management	
Number of Appeals	11
Appeals Upheld	7
Appeals Denied	1
Appeals Abandoned	3
Appeals Rejected	0
Appeals on cancelled orders, etc.	0
Water Management	
Number of Appeals	19
Appeals Upheld	1
Appeals Denied	7
Appeals Abandoned	0
Appeals Rejected	11
Appeals on cancelled orders, etc.	0
Wildlife	
Number of Appeals	7
Appeals Upheld	3
Appeals Denied	2
Appeals Abandoned	2
Appeals Rejected	0
Appeals on cancelled orders, etc.	0
Pesticide Control	
Number of Appeals	60
Appeals Upheld	4
Appeals Denied	40
Appeals Abandoned	5
Appeals Rejected	6
Appeals on cancelled permits, etc.	5

Queen's Printer for British Columbia ©
Victoria, 1988